STRATEGIES FOR INTERNATIONAL CONSTRUCTION RELATED CONSULTANCY FIRMS TO COMPETE IN CHINA

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SUMMARY

With China being a member of the World Trade Organization (WTO), more foreign construction-related consultancy firms (hereinafter referred to as 'foreign firms') are expected to operate in China and participate in its economic growth. The influx of foreign firms would create fierce competition between foreign firms and Chinese construction-related consultancy firms. To succeed in competing with the Chinese firms, foreign firms need to utilize appropriate business strategies to enhance their competitive advantages in China. An appropriate choice of strategies may lead to higher profits, productivity and efficiency, and finally foreign firms may have a firm foothold in China.

The aim of this research is identify critical strategies and important practices for foreign firms to achieve competitive performance in China's construction market. The strategy for foreign firms to achieve competitive performance in China's construction market is explored by integrating three perspectives: Porter's generic business strategy of Western origin; principles of Sun Tzu's military strategy of Chinese origin; and network strategy. The conceptual framework is underpinned by the following strategies: Cost leadership; Differentiation; Focus; Swiftness; Adaptability; Market Intelligence; and Network. The developed theoretical framework postulated that foreign firms could improve their competitive performance in China by combining the

strategies of Western and Chinese origins.

The research method is based on survey. The data collection instrument is a structured questionnaire which is specially designed for this study. Data were collected using mail and face to face interview approaches. In total, 37 completed questionnaires were received from senior executives of foreign firms operating in China's construction market. At the data analysis stage, the factor analysis revealed eight determinants of competitiveness: differentiation factor; focus-training factor; cost leadership factor; risk responsiveness factor; market-oriented swiftness factor; client-oriented swiftness factor; trust-network factor; and resource-network factor.

Factor analysis also showed that, in China's construction market, foreign firms compete in two dimensions: quantitative performance (Y1); and qualitative performance (Y2). Y1 comprises competitiveness in being profitable, and winning large number of project and large value of projects. Y2 comprises competitiveness in quality, client satisfaction and public image.

Among the eight determinants, differentiation, cost leadership, and risk responsiveness are found to have positive impacts on firms' qualitative performance (Y2). Cost leadership and market-oriented swiftness have positive impacts on firms' quantitative performance (Y1). Also, it is found that client-oriented swiftness and resource-network have negative impacts on

qualitative performance and quantitative performance, respectively. Two determinants, focus-training and trust-network, do not have significant impact on either quantitative or qualitative performance.

This study showed that foreign firms need to adopt a combination of both Western and Eastern strategies in order to achieve a higher level of competitiveness in China. It is recommended that foreign firms calculate their competitiveness level using the model developed and validated in this study to gauge their chance of success in China. The findings also offer foreign firms some instruments to identify important practices which may be used to help them build up their competitiveness in China.

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LIST OF ABBREVIATIONS

ANOVA- Analysis of Variance

AVE- Average Variance Extracted

CCA- Canonical Correlation Analysis

CFA- Confirmatory Factor Analysis

EFA- Exploratory Factor Analysis

JVs- Joint Ventures

MANOVA- Multivariate Analysis of Variance

MAPE- Mean Absolute Percentage Error

MPE- Mean Percentage Error

PE- Percentage Error

PLS- Partial Least Square

PSN- Porter-Sun Tzu-Network

SEM- Structural Equation Modelling

SOE- State Owned Enterprise

CHAPTER 1 INTRODUCTION

1.1 Background of the research

China's economy has made remarkable progress in recent years, and she has maintained a Gross Domestic Product (GDP) growth rate of more than 7% for the last eight years. In 2009, China's GDP hit RMB 33,535.3 billion and its growth rate reached 8.7%. In line with this growth, the contribution made by the construction industry to the country's economic development should be noted. The rapid pace of economic development brought increased pressure on the country's strained transportation infrastructure and energy supply, as well as on commercial office space and residential buildings. In 2009, investment in fixed assets and capital construction was RMB 22,484.6 billion, and the contribution of the construction industry to China's GDP was 5.7% (NBSC, 2010).

China's entrance into the World Trade Organization (WTO) has made her an attractive foreign direct investment (FDI) destination in the foreseeable future. By amending the existing laws and regulations to accommodate international firms, China showed her willingness and effort to integrate into the global market and her welcome to foreign firms, which includes construction and construction related firms. Since 1 December 2002, foreign contractors and foreign design firms have been allowed to register as wholly foreign-owned "construction enterprises" and "construction engineering design

enterprises" respectively (MOC, 2002a, b). On 5 January 2007, the Ministry of Construction implemented regulations for foreign-invested design enterprises to apply for architecture, engineering and design licences in China under Decree 114. With the issuance of Decree 114, relevant foreign firms can now apply for engineering and design licences in China and pursue architectural, engineering or construction (A/E/C) related opportunities.

International projects are, however, different from domestic projects. The international construction process is marked by the combination of business and project management skills with both mobile factors of production and location-bound support industries (Enderwick, 1993). In addition to the typical risks of a domestic project, international projects have a complex and subtle web of political, economic, and cultural risks (Han et al., 2005). Therefore, foreign firms have to choose effective strategies to deal with the environment in China in order to secure projects and improve their competitive performance in the Chinese construction market.

1.2 Research problem and knowledge gap

The improved business environment in China has led to the increase in foreign A/E/C firms entering the Chinese construction market. This can be seen in Figures 1.1, 1.2 and 1.3, which illustrate three aspects of firms in the Chinese construction market – the number of firms, the monetary output value of firm, and the construction areas done by

the firm. But it should be noted that considering the increase of inflation during these years, the increase of construction output value may be not so fast. The number of foreign construction firms in the Chinese construction market has not displayed any increasing trend in recent years. The monetary output value of these foreign firms shows an increase in 2004, but only slight changes after 2004. The same trend of increase can also be seen in the gross floor area constructed by foreign firms. When a comparison is done between foreign construction firms and local state-owned companies (SOEs) in these three aspects (see Figure 1.4), the ratios of foreign firms to SOEs were between 0.02 and 0.07. Zhang (2003) studied the business performance of foreign-invested construction enterprises in China and found that although there is an increasing number of foreign-invested construction enterprise in Chinese construction market, they had not shown strong competitiveness compared to local firms.

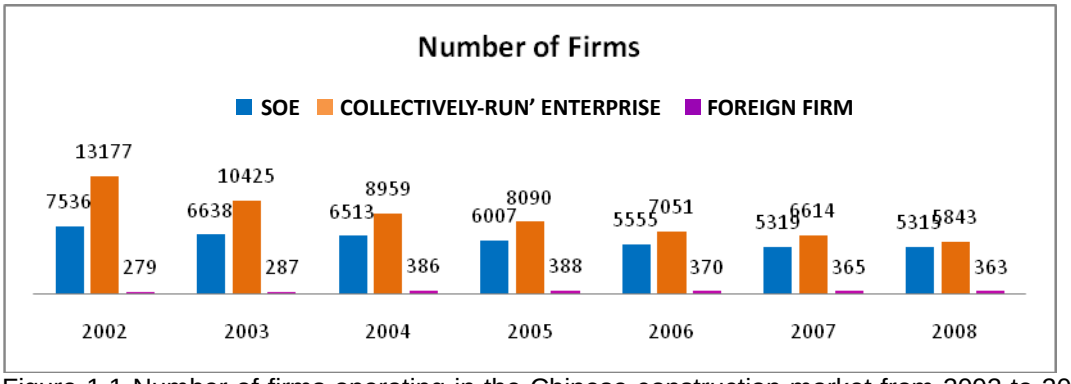


Figure 1.1 Number of firms operating in the Chinese construction market from 2002 to 2008. Source: Chinese Statistical Yearbook (2003-2009)

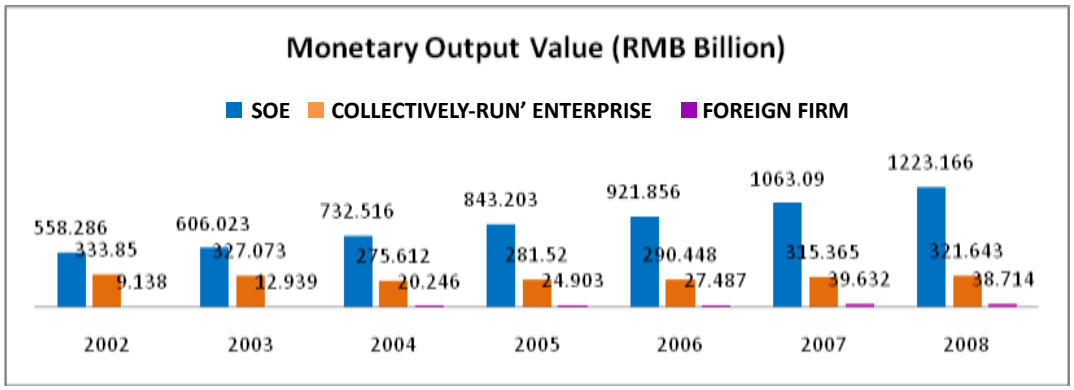


Figure 1.2 Monetary output value of various firms in the Chinese construction market from 2002 to 2008.
Source: Chinese Statistical Yearbook (2003-2009)

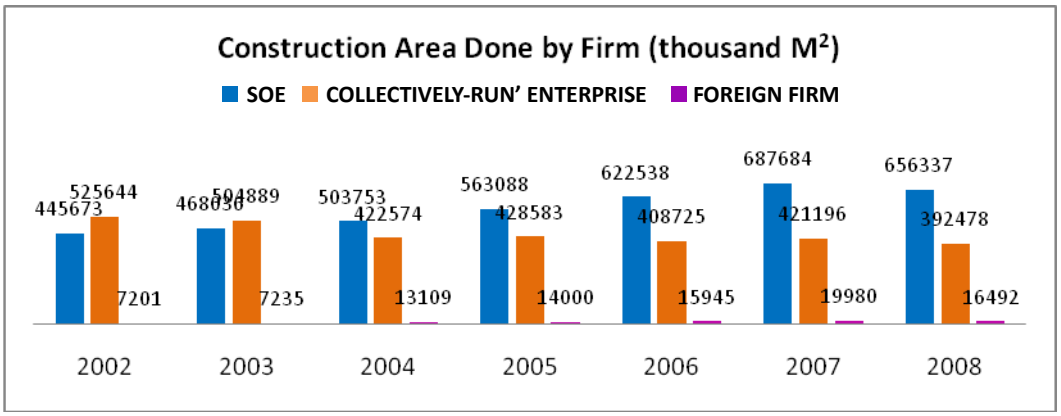


Figure 1.3 Construction areas done by various firms in the Chinese construction market from 2002 to 2008.
Source: Chinese Statistical Yearbook (2003-2009)

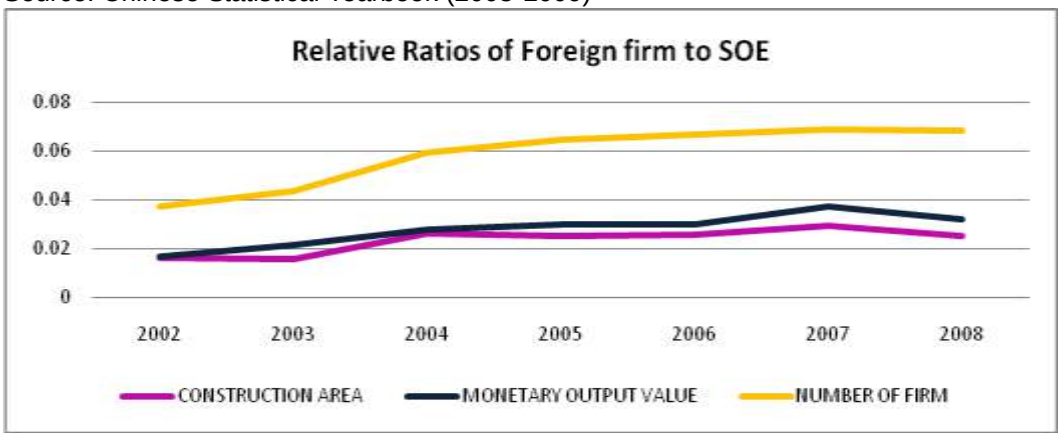


Figure 1.4 Comparison between SOEs and foreign firms in the Chinese construction market.
Source: Chinese Statistical Yearbook (2003-2009)

Although China's entrance into the WTO reduced the barriers for foreigners to operate in the Chinese construction market, foreign A/E/C firms still face many serious challenges. One of the challenges is China transition from a planned economy to a

market economy along a gradual and inconsistent reform path (Jefferson et al., 1994), unlike Eastern Europe which seeks to duplicate the structures of a Western-style market system (Enderwick, 2004). This is the challenge for foreign A/E/C firms, since they are required to adjust to the unfamiliar environment efficiently and effectively. The approaches used by foreign A/E/C firms may not be same as those they used in the Western-style market system.

Another serious challenge for foreign A/E/C firms is that they need to contend with strong Chinese firms. More and more large Chinese construction companies are now capable and competent to the extent that they can even venture into the international market (Low and Jiang, 2003). According to ENR's (2009) report, Chinese international construction firms have improved their performance in the overseas market. Fifty Chinese international construction firms made their way into the list of top 225 international contractors (ENR, 2009). The overall revenue of these 50 firms is $43.2 billion in 2008, an increase of 90% as compared to that in 2007 ($22.68 billion) (ENR, 2008).

An additional challenge for foreign A/E/C firms is that there are unique risks in the Chinese construction market (Ling et al., 2007). Compounding this are the high uncertainty, fragmentation and complexity that foreign A/E/C firms would face in China (Zhu and Hu, 2001; Shen et al., 2001; Lan and Jackson, 2002; Fang et al., 2004; and Kang et al., 2007)

Studies have been done to find the appropriate approaches for foreign A/E/C firms to compete successfully in the Chinese construction market. These include: the risks faced by foreign contractors operating in China (Shen, 2001; Fang et al., 2004), the regulatory and legal systems of China (Zhu et al., 2001), the informality of the Chinese construction market (Wells, 2007) and the characteristics of the construction industry structure (Lan and Jackson, 2002). There are also studies done on the strategies that will enable foreign firms to enter the Chinese construction market. Flanagan and Li (1997) highlighted the areas where UK companies could invest in China. Luo and Gale (2000) discussed the practical aspects of establishing construction joint ventures in China. Xu et al. (2005) studied the issues relating to the strategic alliance-based design/build delivery of foreign contractors. Shen et al. (2006) identified the foreign-invested construction enterprises' strengths, weaknesses, opportunities and threats (SWOT) in developing businesses in the Chinese construction market. Ling et.al (2005a, 2005b, 2006) studied the entry models and business strategies that foreign A/E/C firms adopt when operating in China. The project management strategies that foreign A/E/C firms adopt were investigated by Ling et al (2008).

Though previous studies had proposed strategies to address diverse problems from various perspective, foreign firms did not achieve good performance. For example, Ling et al. (2009) found that foreign firms did not achieve good performance in schedule performance and profit performance in China. This indicates the necessity to study the more effective strategies for foreign firms to adopt. Zhang (2003) found that

the problem is foreign A/E/C firms do not have a systematic framework to help them to be competitive in China. Foreign A/E/C firms from developed countries may be adopting a Western management paradigm to operation in an Eastern country like China. Negandhi and Prasad (1971) discovered that the management process is dependent not only on external environmental constraints but also on management philosophy. The difference between Eastern and Western management philosophies might be the barrier to applying Western strategic theories to the Chinese construction market. Knowledge of the Western market could perhaps be usefully combined with the Eastern principles that are embedded in the Chinese market. From this perspective, a gap exists in previous works as there are no studies done that focused on establishing a conceptual framework which integrates both the strategies from Eastern and Western management systems for foreign construction related consultancy firms to adopt in order to be competitive in the Chinese construction market. The detailed analysis of knowledge gap was shown in Section 2.6.

1.3 Objectives of the research

The main aim of this research is to investigate the strategies that would enable foreign construction-related consultancy firms to be competitive in the China's construction industry. Under this broad aim, the specific objectives are to:

(i) identify critical strategies that enable foreign construction-related

consultancy firms to be competitive in China;

(ii) investigate the important practices that enable foreign construction-related consultancy firms to achieve critical strategies in China;

(iii) develop and test a model that integrates mainly strategies of Western and Chinese origins to measure the competitiveness of foreign construction-related consultancy firms in China.

1.4 Scope of the research

The subjects of this study are foreign construction-related consultancy firms (hereinafter referred to as foreign firms) operating in China but are not headquartered in China. The consultancy services offered by them include architectural, engineering, quantity surveying and construction-related management such as contract management, construction management and project management. Construction firms that provide only project management services in China were also included in the study. Foreign construction firms are excluded because anecdotal evidence suggests that most construction firms offer consultancy services in China, leaving the physical construction work to Chinese firms who have better access to manpower and materials. This approach also reduces foreign firm's investment and expenditure in China.

China is a large country and to limit the scope of this study, only foreign firms operating

in Beijing and Shanghai were studied. Beijing is selected because it is the administrative capital which has extensive development projects. Shanghai is chosen because it is the financial centre of China, attracting a large number volume of foreign direct investment. The projects that they had undertaken include general building, civil engineering and transportation projects initiated by both public and private owners. These projects should be developed after 1999 and completed by end 2008.

This study involves selecting strategies from both Western and Chinese origins. Economic concept is considered in choosing strategies of Western origin. On the other hand, culture is considered in choosing Sun Tzu's 3 strategies: swiftness, adaptability and market intelligence. This study focuses on strategic management, but not culture in a specific way.

1.5 Research hypotheses

The literature pertaining to the origins of strategies to achieve competitiveness suggests that both the strategies of Western origin and the strategic management principles of Chinese origin may have an influence on the competitive performance of foreign firms operating in China. This study hypothesizes that Porter's (1980) generic strategy (comprising "cost leadership", "differentiation", and "focus"), Sun Tzu's Art of War (relating to swiftness, adaptability and intelligence) and the social network strategy (Granovetter, 1985) may be used to explain foreign construction-related

consultancy firms' competitive performance in the Chinese construction market. Based on these, the general hypothesis for this study is set out below.

> A combination of Porter's generic strategy, Sun Tzu's military strategy and network strategies can help foreign firms to achieve a higher level of competitiveness in China.

This research hypothesis is refined in section 3.6.

1.6 Research method

This research employed a survey research design since it is a relatively quick and efficient method to obtain information from the target sample, and generalize the research findings based on the sample involved. The research was conducted in four phases: exploration, description, explanation and validation (see Figure 1.5). The data were collected mainly through a mail survey. The subjects to inform this research were foreign construction-related consultancy firms operating in Beijing and Shanghai.

The data analysis combines traditional descriptive and inferential statistics. Modeling was done using Structural Equation Modelling (SEM). The data were analyzed using Smart PLS 2.0 statistical software. Exploratory and Confirmatory Factor Analysis (EFA and CFA) were used to identify the patterns to achieve competitive performance and the inter-relationships among practices, strategies and performance. The effects of

these inter-relationships were achieved by the Partial Least Square (PLS) approach.

After SEM, a model validation exercise was conducted to examine the robustness and accuracy of the developed mathematical model. New sets of data not used for modeling were collected to validate the model.

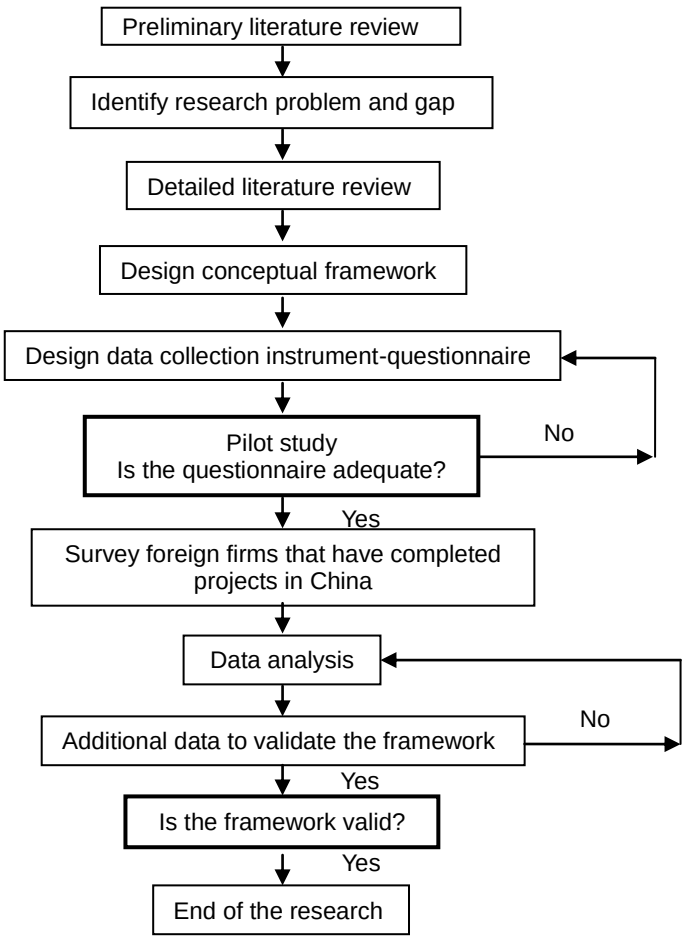


Figure 1.5 Structure of the research

Details of the research method are given in Chapter 5.

1.7 Significance of the research

This research is significant because it combines three streams of different management concepts - Porter's generic strategy, Sun Tzu's Art of War and Social Network Theory, into an integrated framework. This framework may be used by foreign construction-related consultancy firms to help them to achieve competitiveness when operating in China's construction market (See Section 8.3 and Section 8.4)

1.8 Structure of the thesis

The thesis is structured as follows:

Chapter 2 of the thesis is a literature review of the concepts of competition and strategic knowledge of both Western and Chinese origins. This chapter reviews both the theory and practices pertaining to the strategies to achieve competitive performance. The concepts of competition of Western origin and the strategies created by following these concepts were reviewed. The strategic management principles of Chinese origin were reviewed to find out how they could complement the strategies of Western origin. Studies relating to the Chinese construction market and strategies that foreign firms adopted in China were reviewed.

Chapter 3 focuses on reviewing Porter's generic strategy (1980, 1985), Sun Tzu's Art of War (400 BC) and Granovetter's (1985) social network strategy. The applications of

these strategies in related areas were also studied. Based on the literature reviewed, seven strategies were identified and used to set up the conceptual framework.

Chapter 4 reports on the operationalization of the strategies in the conceptual framework into practices. The literature used to operationalize these seven strategies focused mainly on construction. These practices to achieve the strategies were used to design the questionnaire for the survey.

Chapter 5 describes the research process along with the data collection method and data analysis techniques. A survey was conducted and data collected using a structured questionnaire. Structural Equation Modelling (SEM) was used to specify the conceptual framework. Exploratory and Confirmatory Factor Analysis and PLS approaches were used to achieve the objectives of this research.

Chapter 6 reports the empirical results and the model construction. The sample profile and the validation and reliability of the model are reported. The elimination and removal of certain variables are also explained in Chapter 6. The application and validation of the model are described in Chapter 7.

Chapter 8 is the final chapter. The conclusion of the study, the contributions to knowledge and industrial application, limitations of the research and recommendations for future study are presented in this chapter.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature on strategies that are appropriate for firms to achieve competitive performance generally, and when operating outside their home markets specifically. The literature review is categorized into two groups. The first group is aimed at identifying the competitive strategies of both Western and Chinese origins from existing body of knowledge, while the second group focuses on research relating to the Chinese construction market. The first group begins with reviews of the concepts of competition that are of Western origin (Section 2.2). This is followed by the review of strategic studies of Western origin, which are closely linked to the concepts of competition (Section 2.3). The principles that are of Chinese origin are examined in Section 2.4. Studies on networks and the principles of Chinese military strategy are presented in this section.

The second group begins with the literature on the models for foreign firms operating in the Chinese construction market, followed by competitive strategies for firms operating in the international construction industry (Section 2.5). Finally, a gap in the knowledge is presented. To fill this gap, a general hypothesis is proposed.

2.2 Western Economic concepts of competition

Researchers (Caves & Porter, 1977; Porter, 1981) suggested a close link between the development of normative theories of strategies and the academic disciplines of microeconomics. The research in strategy mostly rests on the observation that the nature and character of the competitive conditions facing a firm determine a firm's strategic opportunities (Barney, 1986). Barney (1986) proposed that most strategy theorists' usage of concepts of competitions seems to reflect one of three broad research traditions in microeconomics – industrial organization (IO), Chamberlinian economics and Schumpeterian economics.

2.2.1 Industrial Organization (IO) Competition and Structure-Conduct-Performance (SCP) analysis in industrial economics

Based on Barney's (1986) understanding of IO competition, the returns to firms are determined by the structure of the industry in which the firms are operating. The key attributes of an industry's structure that are thought to have an impact on a firm's returns include the existence and value of barriers to entry (Bain, 1956), the number and relative size of firms, the existence and degree of product differentiation in the industry, and the overall elasticity of demand for the industry (Porter, 1980).

Mason (1993) and Bain's (1956) insights into the relationship between the structural

characteristics of industries and performance of the firm have come to be known as the Structure-Conduct-Performance (SCP) paradigm. The strategy and performance are presumed to follow directly from an industry's structural attributes (Porter, 1981). The SCP paradigm has been considered as a classical approach and has also served as a benchmark or starting point for many economists to develop other approaches (Ormanidhi and Stringa, 2008). Mason (1939) conceptualized the "industry structure-conduct-performance" framework and the basic tenet of the SCP paradigm is that the economic performance of an industry is a function of the conduct of buyers and sellers, which, in turn, is a function of the industry's structure (Mason, 1939; Bain, 1956). The SCP framework proposed that the industry structure is the major force to determine the conduct of a firm, and the conduct of the firm will determine its performance. At the same time, direct influence also exists between industry structure and the firm's performance even without considering the firm's conduct. Bosch (1997) stated that the underlying logic of this framework is that the position of the firm is based on an understanding of the environment.

In the SCP paradigm, economic performance is measured in terms of welfare maximization (resources employed where they yield the highest value output), but it is especially related to the extent of market power (Ormanidhi and Stringa, 2008). Conduct refers to the activities of the industry's buyers and sellers. Sellers' activities include installation and utilization of capacity, promotional and pricing policies, research and development, and cooperation. With regard to firms, conduct involves a

firm's actions in terms of its price setting, advertisement spending, technology, etc. Industry structure (the determinant of conduct) includes such variables as the number and size of buyers and sellers, technology, degree of product differentiation, extent of vertical integration, and the level of barriers to entry (Scherer, 1980).

There are three causal relationships among these elements: the impact of structure on conduct, the impact of structure on performance, and the impact of conduct on performance (Ormanidhi and Stringa, 2008). The SCP paradigm lacks a more explicit analysis of a firm's actions and their ability to influence the firm's performance. This needs to be supplemented by Porter's (1980) work on a firm's competitive advantage (Ormanidhi and Stringa, 2008). The review shows that the structure of the industry and also the conduct of the firm have an important effect on competition, and Porter's (1980) model is therefore relevant to design the conceptual framework of this research (see Section 2.3.2).

2.2.2 Chamberlin's concept of Competition

Chamberlin (1933) developed explanations for the conduct of a firm (i.e. strategy) and performance. Chamberlin (1933) postulated that competition takes place between firms with different, though perhaps overlapping resources and characteristics. Firms can alter an industry's structure by utilizing their special resources and assets to implement strategies that will benefit them. Barney (1986) stated that firm

heterogeneity represents an important source of competitive advantage for firms.

In Chamberlin's (1933) analysis, the key differences between firms that perform well and those that do not are: technical know-how, reputation, brand awareness patents and trademarks and the ability of managers to work together. Chamberlin (1933) believed that some firms can achieve sustained periods of superior financial performance by exploiting their unique assets and capabilities. Chamberlin's concept of competition has many of the characteristics of a monopoly (Barney, 1986). Chamberlin (1933) suggested a connection between monopolistic competition and the theory of strategy. Therefore, the normative theories of strategy are to specify the ways firms can achieve this level of economic performance (Porter, 1980).

Chamberlin (1933) has suggested that a firm should identify the strategies that will allow it to fully capitalize on its individuality and uniqueness, so as to achieve a relatively high level of economic returns from implementing these strategies. This indicates the importance of distinctive competence which is discussed in Section 2.3.3.

2.2.3 Schumpeter's concept of Competition

Many authors, such as Hannan and Freeman (1989), borrowed the "evolutionary" concept from biological studies. Their belief is based on Darwinism (natural selection), whereby only the fittest will survive in a hostile environment. In other words, it is the market that selects the firms, and not the firms selecting the most profitable market.

Evolutionists insist that markets are typically too competitive for expensive strategizing and too unpredictable to control (Whittington, 2002).

Schumpeter (1934, 1942), one of the evolutionary economists, proposed that economic development is a dynamic process and cannot be at a standstill, hence he placed technical change or innovation as the most important aspect of competition. Schumpeter (1934) stated that an entrepreneur should “carry out new combinations” (p.132). The fundamental impulse that sets and keeps the capitalist engine in motion comes from new consumer goods, new methods of production or transportation, new markets and the new forms of organization that capitalist enterprise creates (Schumpeter 1942).

In Schumpeter’s (1934) view, major innovations alter old economic routines. In the more competitive environment, new and small firms have technological ease of entry into an industry. Enterprises with new ideas, products and processes can establish new enterprises that challenge old ones, continuously disrupting established routines in production, organization and distribution. Schumpeter (1942) also examined the innovative patterns in less competitive markets where large established firms prevail and entry barriers exist. He observed that, in order to keep their oligopolistic advantages, large firms pursue a strategy of innovation based on R&D. Accumulated knowledge in specific technology, great comparative advantage in establishing and operating large-scale R&D laboratories, and finally the ease in accessing financial

resources give large firms a competitive edge in creating entry barriers for potential rivals (Schumpeter, 1942).

Based on the evolutionary perspectives of competition, Schumpeter (1934) proposed that innovation is the source that disturbs economic equilibrium and pushes the normal flow of economic life. Therefore, to avoid losing one's position in the economy, innovative technology and means of production must be adopted to stay competitive. Entrepreneurs, neither hedonic nor utilitarian, are those who introduce innovations. While the neoclassical position is to maximize profits, in evolutionary economics, the term "entrepreneurial profits" is used to extend the goal of competition beyond pursuing high profits.

Schumpeter (1934) proposed that competitive advantage comes from efficiency and innovation, and these are influenced by the level of technology and education. However, there are phenomena that cannot be explained by this evolutionary theory. For example, in real imperfect competition many factors, such as information asymmetry or government intervention, can lead to the failure or competitive performance of a firm. In addition, it is difficult to identify which technology is the most advantageous. There is also the difficulty of comparing the effect of sophisticated technology with the effect of broadly applied technology. This indicates that evolutionary economics on its own also cannot explain fully a firm's competitiveness in the international market.

2.3 Competitive strategies of Western origin

Studies on competitive advantage may be based on these approaches: strategic management approach (Chandler, 1962; Ansoff, 1965); competitive advantage and competitive strategy models (Porter, 1980, 1985); and resource-based view and core competence approach (Wernerfelt, 1984; Prahalad and Hamel, 1990; Barney, 1991). In addition, alliance and networking (Nooteboom, 1999) is also an important strategy. A brief review of these is provided below.

2.3.1 Strategic management approach

Chandler (1962) analyzed the relationships among environment, strategy and organization structure, and proposed that “structure follows strategy”. He suggested that strategic management should match the environment to satisfy market requirements; at the same time, organization structure should match and change with the strategies of the organization. Chandler’s (1962) definition of strategy is:

> *The determination of the basic, long-term goals and objectives of an enterprise, and the adoption of course of action and the allocation of resources necessary for those goals (p.37).*

From Chandler’s (1962) study, two schools named the “design school” and “planning school” were established. Planning schools proposed that strategy should be a

controllable, consciously intended course of actions, and senior managers should be in charge of the whole process of planning. Ansoff (1965) highlighted four basic types of decision – strategy, policy, programme and standard operating procedure. In Ansoff's (1965) view, strategies are forced under conditions of partial ignorance where alternatives cannot be arranged and examined in advance. He stated that the objective of the firm is to maximize the long-term return on resources employed within the firm. This objective will guide the firm into the future, and the progress the firm makes along the chosen path should be measured retrospectively. As such, an objective is seen as an end, while strategy is seen as a means to the end. Strategic management refers to a set of managerial decisions and actions that determines the long-run performance of a corporation (Wheelen and Hunger, 2002). It comprises some generic procedures such as environmental scanning, strategy formulation, strategy implementation, and evaluation and control (Wheelen and Hunger, 2002).

SWOT analysis was suggested by Andrews (1971), a pioneer of the design school. By analyzing the firm-level strengths (S), weaknesses (W), opportunities (O) and threats (T), firm-level policies and strategy issues can be addressed. SWOT is an early example of the "organization-environment" notion of "fit" and linkage, that is, matching a firm's strengths and weaknesses to its opportunities and threats (Thomas, 2002). Wernerfelt (1984) thought that Andrews' (1971) traditional concept of strategy is phrased in terms of the resource position (strengths and weaknesses) of the firm. Considering the internal factors of a firm, Andrews (1971) used "distinctive

competences" to describe the strengths that support a firm's good performance in certain aspects. Newman and Logan (1971) applied SWOT to search for the distinctive competences of a firm. Andrews' (1971) definition of strategy is:

> *The pattern of decisions in a company that determines and reveals its objectives, purposes or goals, produces the principal policies and plans for achieving those goals, and defines the range of businesses the company is to pursue, the kind of economic and human organization it is or intends to be, and the nature of the economic and non-economic contribution it intends to make to its shareholders, employees, customers, and communities (p.18).*

Porter's (1980) Five-Forces Framework is an example of the organization-environment model and framework (Thomas, 2002), which uses the industry as the unit of analysis to analyze how a firm's strategy can match, or be constrained by, its industry's environment. The researchers of this school also believed that the chief executive is the architect of a firm's strategy as well as the monitor of its implementation. Top management leadership is emphasized in this school.

It can be seen that although the viewpoints and research approaches of these schools are not exactly the same, the central ideas are consistent. First, the basis of the ideas is to adapt to the environment, and this is the approach that organizations should take to survive and develop. Second, the situation of environment fit is stable, predictable and controllable. Third, the objective of the strategy is to increase a firm's market

share.

2.3.2 Competitive advantage and competitive strategy models

Porter (1980) used strategic positioning and the industry analysis approach to establish competitive strategies. This approach emphasizes a thorough understanding of the competitive position of a firm in the industry for the strategy formulation process (Porter, 1980). The analyses are focused on markets and competitors, as well as the competitive advantages that are increased from a clear exploitation of trends and opportunities. Porter (1980) defined competitive strategy as “a broad formula for how a business is going to compete, what its goals should be, and what policies will be needed to carry out those goals”.

Porter (1980) posits that every industry has an underlying structure, or a set of economic and technical characteristics that gives rise to competitive forces. Thus, in order for a strategist to best position his company within the environment, he must assess the environment and the five forces affecting competition: the threat of new entrants, the bargaining power of customers, the bargaining power of suppliers, the threat of substitute products and the rivalry among existing firms (see Figure 2.1). This model provides the company with a framework for assessing the forces affecting competition in an industry. The underlying assumption within this model is that there exists a direct relationship between the strength of competitive forces and industry

profitability (Bosch, 1997).

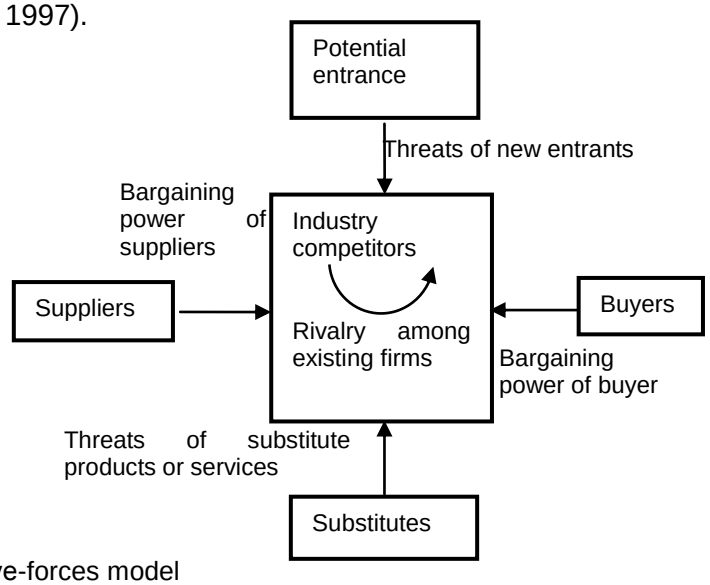


Figure 2.1 Porter's five-forces model
Source: Porter, 1980

Porter's (1980, 1985) generic strategies (Figure 2.2) include cost leadership, differentiation and focus, which will be further discussed in Section 3.2.

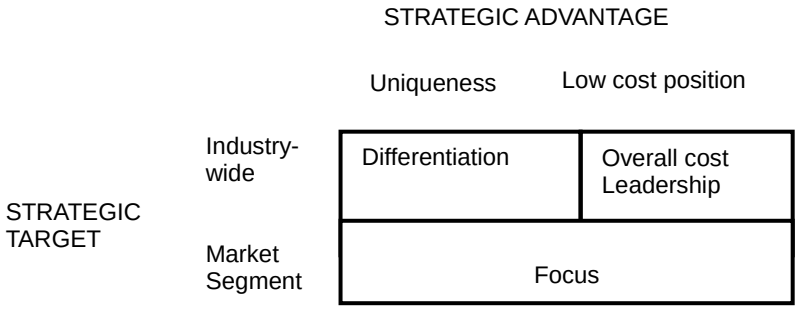


Figure 2.2 Porter's three generic competitive strategies
Source: Porter, 1980; 1985

Porter (1985) proposed that the value chain (Figure 2.3) can be used as a tool to identify potential for competitive advantages by looking at the individual parts of the whole firm. In the value chain, the constituents of a business are structured into categories. The value chain framework describes the interdependent activities of a business, and it is helpful to analyze the value that an organization offers to its

customers relative to the competition. Porter (1985) argued that differences between value chains are a key source of competitive advantage between competitors.

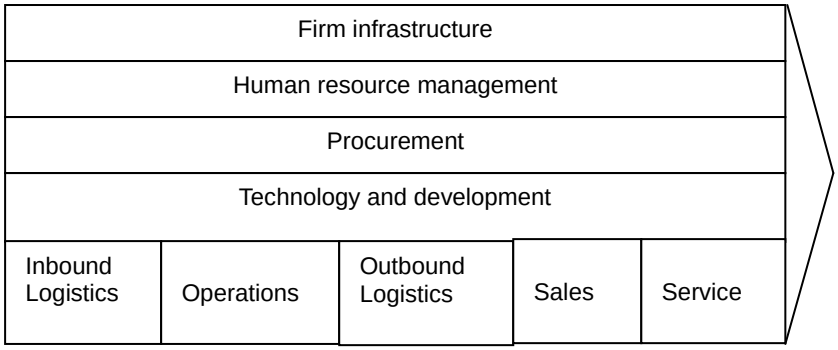


Figure 2.3 Porter's value chain
Source: Porter, 1985

2.3.3 Resource-based view and core competence approach

The premise of core competence approach is that the competences and resources of an organization command the strategy. When competition started showing a more complex trend than before, organizations began to redirect their attention from the external environment to the internal environment, emphasizing the accumulation of unique resources and knowledge. The source of sustainable superior performance lies internally in a firm's capacity to exploit and renew distinctive resources, rather than externally in simply positioning the firm in the right market.

The resource-based view considers that every firm has a resource portfolio: physical (infrastructure), financial, intangible (brand name, public image), organizational (administrative systems, organizational culture) and human resources (HR); and the portfolio creates competitive advantages. The strategic view of resources as a factor

that leads to superior performance has a long tradition in economics and organization literature. Penrose (1959) considered the firm as a set of resources.

Wernerfelt (1984) considered the resource-based view of the firm from a strategic management perspective and suggested that a firm's resources at a given time could be defined as those tangible and intangible assets, and a firm's resources can be used to generate rent. Some examples of resources are brand names, in-house knowledge of technology, skilled personnel, trade contacts, machinery, efficient procedures and capital.

Rumelt (1984) proposed that firms must be less concerned with creating barriers for market entry and more concerned with protecting their specific critical resources and competences. A firm's resources include all assets, capabilities, organizational processes, firm attributes, information and knowledge that are controlled by a firm which would enable it to conceive and implement strategies to improve its efficiency and effectiveness (Barney, 1986, 1991). However, only resources that are firm-embedded, rare and inimitable could generate sustainable rents. Dierickx and Cool (1989) believed that only the resources that are built by a firm and cannot be traded in the market are strategic ones. Grant (1991) proposed that the origin of a firm's competitive advantage lies in the firm's unique and embedded resources, which constitute core and distinctive competences.

The core-competence view was established by Hamel and Prahalad (1994), and

according to them, the capability based on organizational knowledge is a firm's most valuable asset. Hamel and Prahalad (1994) suggested that managers addressing competitive issues facing the new environment in globalization should take a perspective from core competence rather than end products. The source of sustainable superior performance lies internally in a firm's capacity to exploit and renew distinctive resources, rather than externally in simply positioning the firm in the right market. Strategy involves building on core competences (Hamel and Prahalad, 1994), not chasing each and every opportunity. Ramsay (1989) stated that the ability to identify a core skill for an enterprise is an important part of corporate strategy. Mills et al. (2002) presented a framework that considers different categories of competences: core competences (central to the strategy); distinctive competences (recognized by customer); business competences (typical of business units); supportive competences (valuable in supporting a range of other activities); and dynamic capabilities (resources important for change). Thompson et al. (2004) paved a path where a company's performance of its value chain activities can be translated into competitive advantage, and core competence is considered one of the main contributing factors (Figure 2.4).

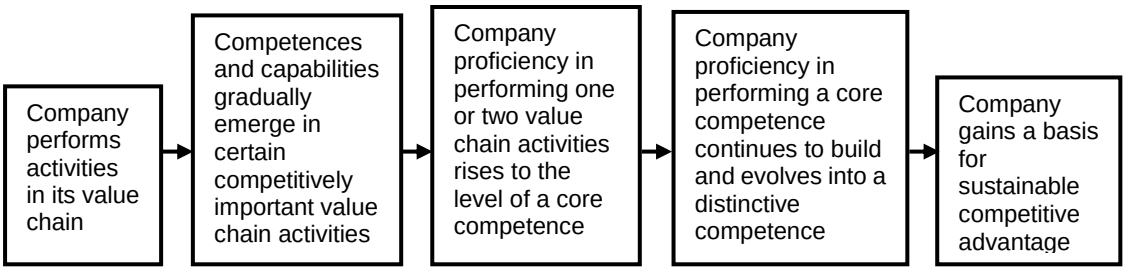


Figure 2.4 Translating company performance of value chain activities into competitive advantage
Source: Thompson et al., 2004

Besides focusing on exploiting firm-specific competences to compete in the market, many firms also focus on knowledge, learning and innovation. Successful organizations are those that focus on new concepts, creativity and strategy innovation (Martinsons, 1993; Perlitz, 1993). Teece et al. (1997) proposed that the greatest potential for contributions to strategy lies in skill acquisition, learning and accumulation of organizational and intangible or invisible assets. The knowledge-based view focuses on the acquisition, internal development, accumulation, exploitation and diffusion of knowledge-intensive organizational capabilities (Herrmann, 2005).

The main propositions of the resource-based view as summarized by Flanagan et al. (2007) are: (i) a firm can be viewed as a collection of resources; (ii) competitive advantage does not depend on market and industry structures but stems from the resources inside a firm; (iii) not all resources are necessarily the source of a firm's competitive advantage, it is only the firm-specific resources that meet the criteria of valuable, rare, non-substitutable, imperfect imitability and imperfectly mobile; (iv) a firm must identify and strengthen those firm-specific resources in developing its core competence; and (v) "resources" refer to not only the possession of firm-specific resources, but also to the effective utilization of these resources to achieve competitive advantage.

The resource-based view is based on two assumptions: first, strategic resources are heterogeneous, hence a firm could achieve unique competitive advantage; and

second, these resources cannot completely flow among firms, therefore their uniqueness is sustainable.

2.3.4 Alliance and Network strategy

The studies on strategies before the 1990's are mostly established on the understanding that competition involves conflict. After the 1990's, strategic alliances and partnerships attracted the attention of researchers. The impetus to study alliances came from the trends and new requirements that emerged in the business environment. First, globalization provides the opportunities to offer differentiated products and services in accordance to the demands of different countries, rather than relying on price competition. Second, the rapid development of information and communication technology (ICT) made it easier to meet the requirements of customers. Besides, ICT also offers flexible methods of development and production. The rapid development of technology and internationalization of markets made the environment even more complex and turbulent for the firms. When the firms gradually shifted their focus to their core competence and skills, they were forced to obtain complementary resources from others. Thus, besides competition among firms, there is also cooperation (Nooteboom, 1999).

Numerous terms have been used to describe this alliance behaviour. Cheng et al. (2000) identified them as: partnering, integration, partnership, network, strategic

alliance, strategic partnership, vertical integration and cooperative partnership. Nooteboom (1999) proposed that alliance is a broad term capturing many forms of inter-firm cooperation that go beyond mere market transactions. It includes “vertical” alliances between buyers and suppliers (subcontracting), “horizontal” alliances between competitors, and “diagonal” alliances between firms in different industries. Granovetter (1985) proposed the Network Theory of Embeddedness which suggests that economic transactions also include social obligations, kinship obligations, knowledge of the identity of transactors, and past relationships between transactors. In particular, the relationship between two parties is embedded in broader systems of social relations.

Granovetter’s (1975, 1985) social network theory offered an explanation for these *guanx*i behaviours from a social-economic perspective. Granovetter (1985) argued that firms may look beyond profit and market relationships, and concentrate also on social relationships.

The Network Theory of Embeddedness (Granovetter, 1985) also suggests that firms are all connected directly or indirectly. Members generate clearly defined standards of behaviour and police each other’s behaviour closely. Any instance of malfeasance is quickly spread through the network. Evidence of the importance of the network to firms includes their tendency to rely on reputation, past relationships, ongoing relationships and possible future relationships in deciding on an economic transaction.

2.3.5 Discussion

This section reviews previous studies on competitive strategies. First, an assessment is made on the assumptions on which these competitive strategies are established. Second, the inadequacies of these competitive strategies when applied to the international environment are discussed. Finally, the definition of strategy for this study is presented, and the need for an integrated framework is established.

2.3.5.1 Assessment of classical approach to strategy

Whittington (2002) categorized Chandler's (1962), Ansoff's (1965) and Porter's (1980) works as "the classical approach to strategy", since these theories are established on similar assumptions. First, strategy is regarded as a rational process of deliberate calculation and analysis derived from the notion of a "rational economic man" (Hollis and Nell, 1975) who is "prudent". This notion of prudence embodies the dual principles of "reason" (the ability to foresee consequences and to discern advantage) and "self-command" (the readiness to abstain from short-term opportunism in order to benefit more substantially in the long run) (Hollander, 1987). Second, strategy is a top-down planning process in a hierarchical command system.

These assumptions are criticized for three related reasons. First, it may be questionable to think that a "human" is a "rational economic man". The "rational economic man" is criticized by some researchers who proposed a range of more

“organic” perspectives of strategies. Cyert and March (1963) proposed that “a rational economic man” exists only in fiction; in practice, people are only “boundedly rational”, thus the environmental scanning, data analyses and calculated comparisons of strategic options tend always to be flawed and incomplete.

Second, the failure of strategies is often related to the separation of formulation and implementation. Doubting the capability of top managers to prescribe effective strategies in the isolation of their executive suites, Mintzberg (1987) proposed that strategy is a continuous and adaptive process, with formation and implementation inextricably entangled. Deliberate strategies and emergent strategies should be distinguished from each other. Porter’s (1980, 1985) works were also criticized by Wit (1997) for their separation of thinking and action, strategic formation and implementation. Porter (1987) tended to consider a “proper planning process” as the link between thinking and implementing. Strategic thinking, however, requires more than analysis alone. For example, successful business strategies result not from rigorous analysis but from a particular state of mind (Ohmae, 1982), and strategy is a thought process that is basically creative and intuitive rather than rational.

Third, there are many “soft” issues, such as culture, human behaviour and regulations, in and out of the organization influencing the implementation of strategies. Even if the strategic planning is perfect, implementation is a process full of conflicts and negotiations.

2.3.5.2 Assessment of resource-based view and core competence theory

Although the resource-based view realized the important role of internal skills and resources in the implementation process, and thus emphasized the careful cultivation of internal competences, it also received some criticisms. Firstly, Priem and Bulter (2001) argued that it is vague and tautological. A technical uncertainty surrounds this theory since it is difficult to operationalize and measure resources and capabilities (Hoskisson et al., 2000). Secondly, too much dependence on equilibrium analysis leads to the trend of static analysis lacking in the study of the resource creation process (Foss et al., 1995). This might have resulted from a basic weakness in the definition of resources which is too broad, numerous and jumbled. Miller and Shamsie (1996) argued that the concept of resources is rarely operationally defined and tested in different environments. Graham et al., (1997) pointed out that the inward focus may risk ignoring the nature of market conditions. Eistenhardt and Martin (2000) argued that the resource-based theory does not pay much attention to the specific mechanisms by which resources contribute to competitive advantage.

Compared with the resource-based view, which proposes that tangible assets lead to competitive advantages, the core competence theory is of the view that only intangible knowledge and capabilities are important organizational factors. In other words, unique and inimitable core competences are special to just that organization.

2.3.5.3 Western originated strategies in the international environment

Since foreign firms operating in China are the subject of this study, the application of these competitive strategies in an international environment is reviewed.

Firstly, international business is confronted with a diversity of national environments. International strategic management focuses primarily on differences in national environments and analyses how firms have to cope with, as well as benefit from, these different national environments (Hofer and Schendel, 1978). Some researchers are of the view that the environment is the primary mechanism for explaining the performance of an organization (Hannan and Freeman, 1984), and environmental factors play an important role in the success of firms in the international market (Porter, 1990; Hannan and Freeman, 1984). Competitive advantages are mainly established based on a firm's country of origin, which can be analyzed by the Diamond framework (Porter, 1990). The generic strategies adopted by firms to achieve these competitive advantages are the outcomes of analysis of the five-forces framework (Porter, 1980, 1985). These approaches indicate that: (i) the effects of a host country's environment on strategy may be analyzed by the six factors in Porter's (1990) diamond framework. The environment, via Porter's Diamond framwork, affects both a firm's initial conditions and its managerial choices (van den Bosch, 1997); (ii) the roles of these six factors, are arranged in the similar way, in terms of exogenous or not, as they are in Porter's diamond. It would seem that foreign firms could predict the environment of the host market, and even if there is some dynamic competition, which is characterized by the

continuous ebb and flow of innovations, firms may be able to renew their market positions by upgrading their resources following the guidelines of the Diamond framework (de Man, 1997).

The SEPT (S-social, E-economic, P-political, T-technology) model, which studies the influence of national environments on firms, distinguishes four relevant segments of the national environment – social, economic, political and technological. Cultural factors, such as social values, are accounted for in the social segment (Fahey and Narayanan, 1986). Van den Bosch and Van Prooijen (1992) also stated that culture should be incorporated in Porter's (1990) analysis. This is not consistent with Porter's (1990) viewpoint that although social norms and values are relevant, these cannot be separated from economic factors, and thus "culture factors are important as they shape the environment facing firms; they work through the determinants, not in isolation from them (p.129)". The disagreement implies that the different effects and roles of these factors in the environment may lead to different strategies being adopted by firms operating in that environment.

Secondly, many researchers view organizational action as constrained or determined by the environment in which it occurs (Hannan andFreeman, 1977; Pfeffer and Salancik, 1978). Westney (1994) adapted this perspective by proposing that each subsidiary of the multi-national corporation operates in its own unique task environment, which constrains or determines the activities of that subsidiary. This is

consistent with the view of Burgelman (1983a) who recognized that strategic behaviour, which he termed as autonomous behaviour, often occurs below top management levels and sometimes in ways that are not actively encouraged by top management. The environmental forces in the market in which firms operate have a great influence on the firms' planning decisions. Therefore, the nature of the local environment will have an important influence on the activities undertaken by the subsidiary. Faced with the unique environment of the host country and the particular managerial principles in this environment, a foreign firm may be influenced by, and learn from, the local strategic management principles for survival and development, especially when the influence of the industry setting in which the organization operates (host country) is stronger and more powerful than the foreign firm's dependence on its organization (Kale and Arditi, 2002).

The above discussion suggests that Porter's strategies alone would be inadequate to set up a framework to explain foreign firms' competitiveness in the Chinese market. It is posited that the strategies, especially those in strategic implementation and execution, established in the Chinese environment will be useful in providing the complementary components (see section 2.4).

Notwithstanding the review above, there are also other studies that suggest there may not be much or any difference in strategies between the East and the West. For example, Low and Leong (2001) found no significant difference between Eastern and

Western generic management functions. In the fieldwork, the presence or absence of East-West dichotomy was investigated.

2.3.5.4 Definition of strategy

The review from Section 2.3.1 to Section 2.3.4 shows that the approaches to achieve competitive advantage are diverse. The concepts of Andrews (1971), Ansoff (1965) and Chandler (1962) on strategy and strategic management were established in response to the growing popularity of strategic planning in large Western corporations. As a result, a large number of definitions of strategy have been attempted (Porter, 1980, 1996).

Mintzberg and colleagues (Mintzberg and McHuge 1985; Minzberg and Waters, 1985) challenged those definitions that emphasize the rational aspects of strategy that are embodied in explicit and formal planning. They suggested that strategy is a pattern in a stream of actions or decisions. Mintzberg and Waters (1985) noted that a strategy is more than a plan; it can be a ploy, a pattern, a position, or a perspective, and there must be various states of dimensions to constitute the strategy. They classified strategy into two types – intended strategy and realized strategy (see Figure 2.5).

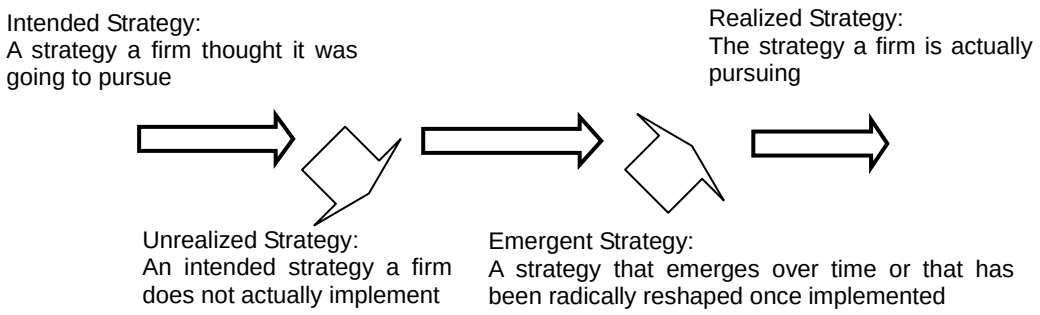


Figure 2.5 Types of Strategies
Source: Mintzberg and Waters, 1985.

Mintzberg and Waters (1985) named those strategies that are realized as intended as "deliberate strategies", and those patterns or consistencies that are realized despite, or in the absence of, intentions as "emergent strategies". Minzberg and Waters (1985) identified three conditions that must be satisfied to ensure the realized strategy (pattern in actions) is formed exactly as intended: (i) there must be existing precise intentions in the organization that are articulated in a relatively concrete level of detail so that there can be no doubt about what is desired before any actions are taken; (ii) the organization must have been common to virtually all the actors; and (iii) there must be no external force (market, technological, political, etc.) that could interfere with the collective intentions. In addition to the intended strategies, there can be emergent strategies that are not the result of conscientious or "top-down" planning, but are the outcome of a stream of smaller decisions from the "bottom-up" (Minzberg and Waters, 1985).

These insights are helpful for understanding business strategies in international business, especially in China's transition economy, where formal intended strategies

are rare, and informal emergent strategies are numerous (Peng, 2001). Besides the deliberate planning, there must be some strategies to deal with unforeseen situations.

2.4 Strategic management principles of Chinese origin

Differing from the reviews of competitive strategies of Western origin, which begins with linkages between competition concepts in microeconomics and strategies, the review of strategic management principles of Chinese origin begins with studies on traditional Chinese culture. This is supported by the views of researchers (Oliver, 1997; Powell & DiMaggio, 1991) that, in addition to focusing on competition and managing its resources, a firm also needs to take into account broader influences from such sources as the state, society and culture when crafting and implementing its strategies.

2.4.1 Cultural approach in analyzing strategies of Chinese origin

In Kroeber and Kluckhohn's (1952) perspective, "culture consists of patterns, explicit and implicit, of and for behavior acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiment in artifact; the essential core of culture consists of traditional (i.e. historically derived and selected) ideas and especially their attached values; culture systems may, on the one hand, be considered as products of actions, on the other as conditioning elements of further

action". The reasons for using culture as an approach to study Chinese strategic management principles lie in three aspects.

Firstly, cultures do have an effect on strategic management. Crucial elements of management process "differ from one country to another as a function of the local culture" (Hofstede, 2007, p.411). Hofstede (2007) identified five dimensions where Western and Eastern cultures differ: (i) individualism vs. collectivism; (ii) power distance; (iii) uncertainty avoidance; (vi) achievements vs. nurturing; and (v) long term vs. short term. Van Dijck (1990, p.478) stated that a key element in European management is the capability in "reading and interpreting the complex and diversified social, cultural and political European business environment".

Secondly, the cultural approach had been used to identify many valuable suggestions for multinational companies in international business. For example, individualistic cultures (e.g. U.S. culture) may have an advantage in improving technological assets, while collectivistic cultures (e.g. Japanese culture) may benefit by establishing relationships among contractors, suppliers and joint-venture partners (Dunning and Bansal, 1997). Strategy is influenced by the cultural distance between the home base and target country (Hennart, 1988), and kinship relations influenced Chinese investors' decisions (Li and Khatri, 1999). Cultures with a large power distance and high uncertainty avoidance are more compatible with defender strategy (Bluedorn and Lundgren, 1993). Dunning and Bansal (1997) found that the performance of a

multinational enterprise in the host countries is influenced by the culture it adopts in joint ventures. A foreign firm which exhibits low individualism culture would perform well in joint ventures in the host country.

.Thirdly, China is portrayed as part “emerging economy” and part “transition economy” (Peng et al., 2008). Researchers (Hoskisson et al., 2000, Powell, 1991) asserted that in emerging economies, institutional theory, especially the analysis of institutions that are shaped by the culture, appears critical in providing significant insights into understanding the particular business behaviour of the Chinese. Culture is considered as an important constraint embodied in traditions, taken-for-granted rules and conventions, and widely accepted preconscious customs, influencing the behaviour of individual managers and their firms (Peng and Heath, 1996; Peng and Luo, 2000). Culture provides a structure for everyday life by defining and limiting the set of choices of individuals and organizations. No firm can be immune to the institutional frameworks in which it is embedded (Granovetter, 1985).

Therefore, management theorists and practitioners should consider the development and application of Chinese cultural values in developing the theory and practice of management science (Huang, 2008). Chinese traditions can be applied to identify managerial theories and practices. In this research, the study of strategic management principles of Chinese origin focuses on two aspects – network strategy and dialectical principles from military strategies.

2.4.2 Network strategy

It may not be surprising to find that Chinese managers prefer to use a network-based strategy to achieve firm growth (Peng and Luo, 2000). This is consistent with the view that strategic choices are inherently affected by the national culture in which the firm is embedded (Hofstede, 1991). *Guanxi* is a cultural characteristic that has strong implications for interpersonal and interorganizational dynamics in Chinese society (Xin and Pearce, 1996). It is deeply embedded in China's culture, with a long history. Chinese society has been functioning as a clan-like network since Confucius codified societal rules, values and hierarchical structures of authority during the sixth century BC (Park and Luo, 2001). When a situation arises which is beyond an individual's capacity, the *guanxi* network is mobilized to accomplish desired results (Redding and Ng, 1982).

Modern Chinese society still operates within the realm of these countless social and business *guanxi* networks (Park and Luo, 2001). This is because, in present transition economies, informal constraints, mainly arising from network contacts, are extensively used to coordinate economic activities (Peng, 2000) since informal constraints rise to play a larger role in regulating economic exchanges during the transition (Peng and Health, 1996). At the same time, these network contacts have considerable influence over both the behaviour of individual managers and their firms and the generation of new formal constraints.

In China, the concept of networking is known as *guanxi*, which is looked upon as an important competitive capability of Chinese firms (Cheah et al., 2007). Yeung and Tung (1996) explained how this form of *guanxi* is established using the altercasting method. Wong (2007) studied *guanxi* and its role in business. The results showed that *guanxi* played an important role in business, not only for personal benefit but also for the harmony of the community. He also suggested that it is necessary to pay attention to the changing perspectives of *guanxi* between the old and new generations, which have added a dynamic dimension to the subject of *guanxi*. When doing business in China, it is important to set up networks (*guanxi*) to enhance reputation, power and influence for effective business relationships (Yeung and Tung, 1996; Westwood and Chua, 1992). The role of these networks can be used to understand and interpret the decisions made by enterprises (Laville, 2007).

2.4.3 Strategic management principles from Chinese military strategy

The identification of dialectical principles from Chinese military strategy is done through three steps. The first step is to explain the feasibility of using Chinese military strategy as a resource to study strategic management of Chinese origin. The second step is to explain why Sun Tzu's *Art of War* is chosen out of the seven Chinese military classics for study on strategic management principles. The third step is to describe the practice of Chinese military strategy, which is used as a framework to identify

dialectic-oriented principles for setting up the conceptual framework in Chapter 3.

Strategy as a term has very strong military roots. It is not unusual to apply military strategy to business management. In the Western context, considering the commonality of competition, several researchers and practitioners have suggested that military strategy may be applied to marketing in a highly competitive situation (Hendon, 1986; Ries and Trout, 1986). Ansoff (1965) links his notion of strategy directly to both military practice and academic economics. Ries and Trout (1986) attempted to simplify and apply the basic propositions of military works to modern organizational theory and strategy. Based on the belief that classical military strategy offers guidelines for marketing strategies, researchers (Parks et al., 1994) acknowledged the contribution of Clausewitz, a famous military strategist from the West, in winning market share. Although warfare is just used as a metaphor for marketing, it has dominated the way researchers in marketing and business strategy think about and discuss industry competition (Rindfleisch, 1996). Hoskin (1990) also found that many of the earliest managerial systematizers of American business shared military origins.

In China, for more than 2,000 years, strategies have sought and proclaimed that certain fundamental truths and guides for action exist in one of the activities mankind is most frequently engaged in – warfare (Cohen, 1990). Incalculable warfare filled Chinese history. Briefly, there are two reasons to use Chinese military strategy as a

resource to study Chinese management principles. Firstly, if the China-specific managerial ideas and strategic principles are set up based on unique Chinese traditions and realities (Huang, 2008), Chinese military strategy, a component of traditional Chinese culture, will contribute valuable practical knowledge to strategic management. Secondly, Chinese management knowledge originates primarily from non-economic areas, considering China is an agricultural society; thus its traditional culture and practical managerial principles may contribute to understanding strategic management of Chinese origin. Hence, management principles may be established based on traditional Chinese philosophical attitudes and they may be influenced by principles from non-business areas.

In China, military strategy is one of the nine components of culture. Li (2008) and Yuan (2008) classified these nine areas of knowledge into two categories – subjects and schools. The “subjects” category consists of ideas that are linked to practices, while the “schools” focus on main ideas and philosophies, which are more academic and ideological. The philosophies and ideologies of “schools” influence the actions of “subjects”; at the same time, the actions and activities of these “subjects” are usually used as evidences to support the viewpoints of the “schools”. Knowledge of military strategy is compatible with two other components of “subjects” and all the components of “schools”. This can be attributed to the generality of military strategy in Chinese history whose development is accompanied by unstopped wars. It is normal to use military cases and principles to establish the philosophical ideas of these schools and

to test their value. Hence, the principles of military strategy are often used as a tool to analyze management thinking and actions influenced by a culture of “unity, harmony, peace, dialectic and systemic thinking logic” (Li, 2008 and Yuan, 2008).

Generally, ancient China has seven important military texts. *Wu Jing Qi Shu* is an authoritative collection of ancient military literature (Pian et al., 2007). According to Sawyer and Sawye (1993) who are responsible for one of the latest translations, the seven military classics include the following texts: *Six Secret Strategic Teachings*; *The Methods of the Ssu-ma*; *The Art of War*; *Wei Liao Tzu*; *Wu-tzu*; *Three Strategies of Huang Shih-kung*; and *Questions and Replies between T’ang T’ai-tsung and Li Wei-Kung*. These seven classics may be regarded as the essence of Chinese military knowledge. These military classics are briefly reviewed below, and the main ideas of them are shown in Figure 2.6.

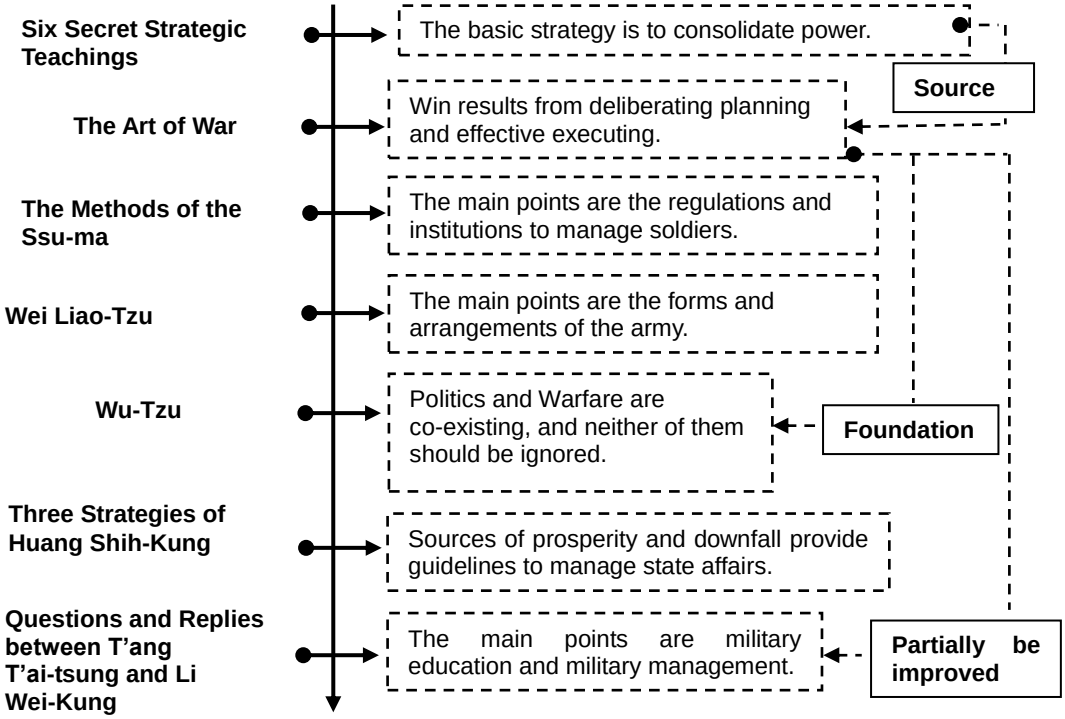


Figure 2.6 The seven military classics of China
Summarized based on Pian et al., (2007), Sawyer and Sawye (1993), Li, 2006 and Li, 2008.

2.4.3.1 Jiang Ziya (Taigong)'s *Six Secret Strategic Teachings*

Jiang Ziya, the original source of Chinese traditional military texts, contributed much to the later frameworks and systems of military strategies that were established by later generations. *Six Secret Strategic Teachings* provides information beyond military strategies; the intention of the book is to guide readers on the management of state affairs, army issues, and to direct folk customs.

Divided into six sections, the book comprises a total of 60 articles. The military strategies in this work are not explained and demonstrated from a single perspective, but are analyzed combining politics with state affairs. In Jiang Ziya's view, the basic strategy is to consolidate power. To do so, it is important to love the population, comply

with their ideas and respect virtuous people. Besides the contents that are relevant to military strategy, approaches to economic development and monetary policies were also suggested by Jiang Ziya.

Six Secret Strategic Teachings is acclaimed for its all-around, creative and exploitive characteristics. However, the contents of the work are more appropriate for the management of state affairs. The ultimate intention of the book's strategies is to overthrow a state and establish a new state.

2.4.3.2 Sun Tzu's *Art of War*

The *Art of War* is divided into 13 chapters covering the following diverse areas which affect warfare: planning, waging war, offensive strategy, tactics, energy, weak and strong points, manoeuvres, tactical variations, on the march, terrain, the nine varieties of ground, attack by fire, and espionage. The detailed contents of Sun Tzu's *Art of War* are presented in Section 3.3.

2.4.3.3 *The Methods of the Ssu-ma*

Ssu-ma's work is mainly about the institutions and regulations for managing soldiers. "Methods" here refer to the decrees, principles, types and forms of regulation rather than the strategies and tactics. Hence, *The Methods of the Ssu-ma* is classified into military ceremony observances. This work is valuable for the study of ancient Chinese military institutions and observances.

2.4.3.4 *Wei Liao-tzu*

Wei Liao-tzu consists of two parts. One is the approach to achieve wealth for the nation and build a strong army. The other is about the tactics for manoeuvring the army, where *Wei Liao-tzu* focused on the form and arrangement of the army. *Wei Liao-tzu* also emphasized on the appearance and form of the army.

2.4.3.5 *Wu-tzu*

Wu Qi's ideas, expressed in the book *Wu-Tzu*, covered four aspects – attitude to war, attitude to national defence, approaches to manage an army, and principles of warfare. Wu Qi divided wars into two categories, in terms of justice and injustice, and to him only the pursuit of justice can give rise to long-term success. Wu Qi emphasized that politics and warfare are co-existing, and neither of them should be ignored. Furthermore, the victory of a war is determined by civil politics. Wu Qi did not place importance on the number of soldiers, but emphasized the administration of the soldiers. In brief, avoiding enemies' strengths and attacking their weaknesses, being prudent but not hesitant, matching the real situation, and responding to unplanned situations are the key principles advocated by Wu Qi.

Later generations classified Wu Qi's military principles and Sun Tzu's *Art of War* as sharing similar characteristics, such as "to guard nation by *Zheng*, to move forces by *Qi*, to consider tactics prior to conflicts and to use techniques that match the situation. Wu Qi's principles are clouded by doubts about who the true author is. It is also

believed that the work had been edited by later generations. Judging by the contents of the texts, it seems that Wu Qi's work might have been established from Sun Tzu's *Art of War*.

2.4.3.6 *Three Strategies of Huang Shih-kung*

Although *Three Strategies of Huang Shih-Kung* is complied into *The Seven Military Classics of China*, the dispute over this work is the greatest among all. First, the literal narrative in the work is full of the characteristics of a legend, which reduces its credibility. Second, this work is established by adopting ideas from the various schools, integrating morality, materiality, policy and authority. The true intention of the work is to provide guidelines on managing state affairs by identifying the source of prosperity and downfall.

2.4.3.7 *Questions and Replies between T'ang T'ai-tsung and Li Wei-kung*

The military information in this work is compiled from the exchange between T'ang T'ai-tsung and Li Wei-kung. The strategies found in this work involve military institutions, military regulations, military training, issues of frontier defence and command in a war. The focus of this work is on military education and military management. The approach used by the author to support his viewpoint is the citing of various examples.

Later generations who assessed this book saw its main contribution in its improvement

of certain strategies of Sun Tzu's *Art of War*, e.g. *principles of Zheng* and *Qi*, direct and indirect attack and defence.

The contents of the seven military classics are briefly summarized based on the knowledge from *Wu Jing Qi Shu* (Pian et al., 2007). *Six Secret Strategic Teachings* is the original source of Chinese traditional military texts, contributing much to later frameworks and systems of military strategies. *Art of War* deals with the strategies to win a war. *The Methods of the Ssu-ma* is mainly about institutions and regulations to manage the soldiers. Wu Qi's *Wu-tzu* covers attitude to war, attitude to national defence, approaches to manage an army and the principles of warfare. Based on the contents of the texts, Wu Qi's work might have been established from some parts of Sun Tzu's *Art of War* (Li, 2006 and Li, 2008). *Wei Liao-tzu* focuses on the form and arrangement of the army. The objective of *Three Strategies of Huang Shih-Kung* is to identify the source of both the prosperity and downfall of the state. *Questions and Replies between T'ang T'ai-tsung and Li Wei-Kung* involves military knowledge of military institutions, regulations, training, frontier defence, and command in war. According to the standards of classification proposed by Li (2006), Sun Tzu's *Art of War* is more mature and focused, and it contains a more complete knowledge on the strategy of war compared to the other works.

Although it has been said that Sun Tzu's *Art of War* is inspired by Jiang Ziya (Taigong)'s *Six Secret Strategic Teachings*, Sun Tzu's work discusses mainly the

principles to win a war, but not economic and national policies. Sun Tzu's *Art of War* comprises diverse aspects of strategic issues ranging from the main attitude to war, and contents of strategy to the principles in moving forces. These are not only consistent with the subject of this research but are also necessary to provide information for establishing the conceptual framework.

The application of Sun Tzu's *Art of War* to areas besides the military is broader than the other principles. The *Art of War* has been translated into at least 30 versions. Since the 1980's, the *Art of War* has been applied to fields outside the military. A variety of business books have been written applying Sun Tzu's principles to office politics and corporate strategy (Gerald, 2001; McNeilly, 1996; and Krause, 1995). Many Japanese companies require their key executives to read this book (Kammerer, 2006). The *Art of War* has also been the subject of some law books. Some legal articles have identified strategies for use in the trial process, negotiation tactics and trial strategy by combining Sun Tzu's *Art of War* with professional knowledge in law (Barnhizer, 1997; Harris, 1991).

Since Sun Tzu's *Art of War* has been widely used in business management, it is feasible for this research to also use it to underpin part of the theoretical framework of this study (See Section 3.6).

2.4.4 Consideration of Chinese military strategy

The Chinese military strategy is influenced by mainstream traditional Chinese philosophy, and it can be better appreciated with an understanding of the role of military strategy in traditional Chinese culture.

Among the nine components of traditional Chinese culture, which has evolved for more than 5,000 years, two of them – Confucianism and Taoism – play a significant role in influencing and moulding other subjects and schools, as well as producing a culture of humanism, making the Chinese way of life intensely practical and philosophical (Sheh, 1995; Haley et al., 1998; Huang, 2008). Taoism and Confucianism run in parallel harmony throughout Chinese history so much so that every Chinese is at once a Taoist and a Confucianist (Chan, 1963). Low (1995) found that Confucianism is the dominant system in Chinese history and thought which emphasizes social order and an active life. Taoism, on the other hand, concentrates on individual life and tranquility, thus suggesting that Taoism plays a secondary role to Confucianism in Chinese society. Although Confucianism and Taoism are different in their approaches, they both highly value the integrity of the individual and social harmony (Low, 1995). Taoists and Confucianists alike recognize an ultimate, undefinable universal reality that supports, contains and unifies all the things that people observe and all the events that they experience (William and Jae, 2006).

Confucianism stressed the virtues of a gentleman such as *Zhong* (loyalty), *Xiao* (piety),

Ren (benevolence), *Ai* (love), *Yi* (justice), *He* (harmony) and *Ping* (peacefulness). From a military strategy perspective, Sun Tzu recognized that warfare is the greatest affair of state, the basis of life and death, the way to survival or extinction (Sawyer, 2007). Hence the philosophy developed by Sun Tzu is to outline specific strategies to overcome conflicts while viewing the world as a complete and interdependent system which must be preserved (Low and Tan, 1995). From this perspective, China's strategic culture has kept the need for moderation and harmony uppermost in China's strategic and philosophical minds (William and Jae, 2006).

Taoists observe nature to discover the way, which is known as the *Tao*. *Tao* is both intrinsically eternal and dynamic. This view holds the belief that while heaven changes, all the world beings with their different peculiarities need to regulate themselves to maintain harmonious interaction (Huang, 2008). The predominant pattern within Tao is the cycle. The cyclical reversal patterns in *Tao*'s eternal motion reflect the eternal pairing and interplay between *yin* and *yang*, and intellectual ideas penetrate every dimension of Chinese living (William and Jae, 2006). Tossed between *yin* and *yang*, the role of *Tao* is not to subdue nature, but to act in harmony with the cyclical current and environment. This *yin-yang*, which is grounded in Taoism, views paradox and change as a normal state of being (Fang, 2010). The *yin-yang* philosophy perceives objects essentially as a dialectical and changing phenomenon full of paradoxical value and behaviour orientations, and this dialectical and changing perspective of the objects differs from the static and bipolarized vision (Fang, 2010). According to

dialectical philosophy, different problems require different methods for their solution, that is, different conditions and environments call for different managerial responses and decisions (Huang, 2008). In Chen's (2008) perspective, a paradox implies a consideration not of individual parts and their existence in a state of conflict, but of the whole and how it links diverse and conflicting elements; consequently, it comprehends the interdependencies and interrelationships of the disparate pieces. It is a conception rooted in a long-held worldview of integration and balance.

Based on the above explanations of Confucianism and Taoism, in this research, the implications of Chinese military principles are relevant to the study of strategic management as a dynamic and changing phenomenon. In Chinese military strategy, strategists like Sun Tzu proposed a dynamic power and integrated force that combined the effects of material things, natural forces and human factors (William and Jae, 2006). Realizing the continuous and dynamic nature of management, commanders manage military strategies by changing over time and space.

Based on the dialectical perspective reviewed above, three implications are derived:

(i) victory is both "predictable" and "unexpected";

(ii) strategy is both "designed before the war" and "created during the war"; and

(iii) to win a war is to win both "before" and "during" the war.

In this research, Sun Tzu's military strategies which contain dialectical perspective, are used to underpin the theoretical framework (See Section 3.6).

2.5 Strategic management in the construction industry

This section is organized in two parts. First, the strategic management models in the construction industry are reviewed. It should be noted that the literature reviewed here does not include some of the works that used Porter's models as these are reviewed in Section 3.2. Second, studies on strategic management that focused on the Chinese construction market are reviewed. The focus is on the strategic management models for foreign firms operating in China.

2.5.1 Strategic management models in the construction industry

Many researchers have introduced general models and strategic approaches for strategic management of the construction industry using the different strategic theories.

Warszawski (1996) presented a procedure for strategic planning suited for construction companies, which includes examining the company's mission, analyzing the business environment, analyzing the main resources and developing the final strategy. The types of strategy are growth, and Porter's (1985) cost leadership,

differentiation and focus. The main resources of the company are construction capability, procurement system, marketing system, organization, personnel, finances and knowledge.

Venegas and Alarcon (1997) developed a general framework to support the strategic planning of a construction firm. It provided a structured path and tools to carry out the planning process. The strategic planning process is divided into three modules – entry module, formulation module and implementation module. In the entry module, some preliminary internal and external analysis should be conducted, such as culture, philosophy, human resources and environment. Mission and goals need to be addressed in the formulation module, and then conceptual modelling, mathematical modelling and strategy evaluation will be conducted. Finally, in the implementation module, the annual strategic plan and implementation plan are developed, and some control activities are conducted. This framework is flexible enough to be adapted to particular company characteristics for strategic planning. It also allows management to test different combinations of a company's long-term strategies and predict sales, market share or other measures of company performance.

Chinowsky (2000) introduced a strategic planning model which focused on the development of strategic concepts based on the inputs provided by seven areas of strategic management, namely vision, mission and goals, competition, markets, finance and economics, education, core competences and knowledge resources. This

model may be used to evaluate a strategy and determine the progress towards the strategic objectives. The result suggested that the strategic management areas and the realistic characteristics of an organization are important for a firm's success.

Porter's (1980,1985) generic strategies were applied to study competitive position in the U.S. construction industry (Kale and Arditi, 2002). In their research, competing on quality of products/services, process innovations, cost and time were included into the mode of competition. The scope of competition could adopt either a narrow or a broad market, which means either concentrating on a focused market segment or sharing resources among different projects and locations. The research revealed the significant relationship between company performance and choices of scope and mode of competition. At the same time, the result suggested that the company that chooses more than one mode outperforms its rivals. According to the scope of the competition, the research suggested a neutral approach, i.e. one that is between a narrow and a broad approach.

Haan et al (2002) used the core competence approach in the construction industry by focusing on the analysis of the fit between the strategies of construction firms and their core capabilities. The core capabilities in terms of innovation, market management and production are important to the companies' superior economic performance and support the companies' marketing strategies.

The strategies for construction firms to handle the new market have been studied by

Teo (1997). She established the conceptual framework by combining the strategies of diverse origins. Based on the theory of the firm, the theory of multi-market completion environment, and the models of strategies, the degree of difficulty in handling new market was investigated. Using the theory of flexibility, the characteristics of flexibility, and the theory of movement, flexibility of construction firms and areas of improvement was determined. The study also identified models to evaluate mobility and diversification for contractors in a new market.

2.5.2 Strategies for operating in China's construction market

Boisot and Child (1999) developed a model named the institutional information-space (I-Space) framework to analyze the characteristics of a national system. They recommended two modes in terms of complexity reduction and complexity absorption. For Western firms operating in China, the country is treated as an uncodified, undiffused and concrete complex system. Thus, complexity absorption that is more consistent with the Chinese culture is recommended for Western operators.

Chen (1997) verified that foreign participants will be most successful in project management, supervision and training of local construction companies in the fields of power generation, energy exploration, transportation, telecommunications and housing. Joint ventures are also highly recommended for foreign investors when doing business in China.

Flanagan and Li (1997) highlighted the areas where U.K. companies could invest in China. These include finance and BOT, technology and transfer of technology, management and consultancy skills, real estate development, design, construction, construction materials and components supply, education and training, and environmental technology.

Xu et al. (2005) studied the issues relating to the strategic alliance-based design/build delivery of foreign contractors. SWOT analysis was used to find out the strengths, weaknesses, opportunities and threats of foreign operators. Based on the SWOT result, the top five factors for a successful strategic alliance between foreign contractors and design institutes are mutual trust, synergistic strengths and complementarities, market demand for services, flexibility of both parties, and minimum change of top managers.

Shen et al. (2006) identified the strengths, weaknesses, opportunities and threats (SWOT) of foreign-invested construction enterprises (FICEs) developing businesses in the Chinese construction market. Management ability, technological ability, financial ability, organization and operations were classified into the factors affecting the strengths and weaknesses of the enterprise. The opportunities and threats of the enterprises were affected by the social and political environment, economic environment, market opportunities and competition mechanism. A reformed policy environment, an established credit system, market access protected by WTO

agreement and the international practices developed by the Chinese construction industry ensure the opportunities for FICEs. However, FICEs will meet many threats operating in an unstable market where the risk of breaching contracts is very high and in the face of increasing intense competition. The strengths of FICEs include good project management and cost control skills, information management facilities, advanced equipment, high labour productivity, finance-raising ability, better debt/asset ratio and attraction for good human resources. What FICEs usually lack are professionals, channels to obtain market information, knowledge of regulations and business relationships, and they have higher production costs.

Ling et al. (2005a, 2005b, 2006) studied foreign A/E/C firms operating in China and discovered the determinants of project success, helpful enablers, effective business strategies and important project management practices. Ling et al. (2005a) studied the effective business strategies for international ACE firms in China by combing services and products strategies, procurement strategies, financial strategies and network strategy. Differentiation and network strategies are strongly recommended. They suggested that to achieve differentiation, firms need to be flexible and daring, and offer special products and services for a niche market, superior quality in technology and architecture, integrated services, core competences, new ideas and management superiority, speedy response in satisfying clients' requirements, quick decision making, finance package, competent professionals and good track records (Ling et al., 2005b and Ling et al., 2007). In their studies, networks can be achieved through networking

with local clients; networking between headquarters and subsidiaries; networking with actual local persons; networking among international firms; networking with suppliers, contractors and subcontractors; networking with local agents; networking with home country clients; networking with home country government; networking with local firms; and networking to obtain knowledge and establish *guanxi*.

2.6 Gaps in the knowledge

Generally, the quest for competitive advantage has been one of the dominant themes in the field of strategic management. To achieve competitive advantages, different schools have proposed diverse strategies based on different assumptions. Their avenues to competitive advantages are different, due to the particular contexts where their ideas are established. No one strategy is perfect, since they are based on different assumptions.

As shown in Figure 2.7, to achieve competitive advantages, one school emphasizes more on the influence of external environment on competitive strategy. According to this school, achieving competitive advantages is through a detailed analysis of the environment followed by deliberate planning. However, no one can ensure that the deliberate plan will lead to competitive advantages because various incidents could happen between planning and performance. The plan might be wrong even at the very beginning if the strategist is not an absolutely rational person. Even if the plan is

perfect, conflicts may arise during the implementation of the plan. Misunderstanding between the top decision maker and field managers may also arise, which may lead to the opposite of the desired outcome of the original idea. Even if the implementation is smooth, unpredictable issues may still crop up.

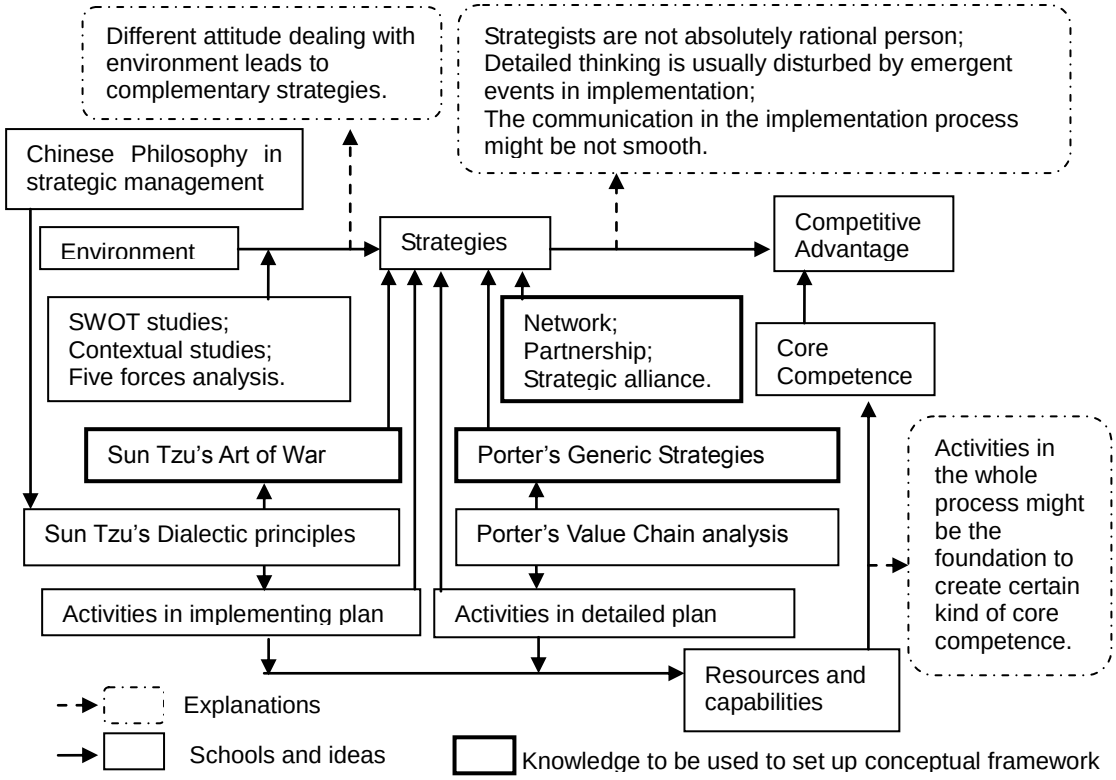


Figure 2.7 The explanation of the knowledge gap

Besides the incidents that may occur during the implementation process, there is a wide gap between Western and Chinese philosophy in strategic management. The routes of strategic thinking are influenced by the environment where the strategist grew up. Even if the strategies are perfectly planned, major differences still exist between those based on the Western contextual environment and those based on the traditional Chinese cultural context. The strategies established in a particular

environment will be helpful in meeting any new requirements that arise within that environment. Based on functional adaptability, firms will have opportunities to exert their special advantages and innovate to extend these advantages.

The other school emphasizes internal resources and capabilities as the way to achieve competitiveness. The thinking is that only core competences (key abilities and skills), unique and inimitable, will help a firm achieve competitive advantages. Thus the main task is to identify a core skill in the firm. However, if the core skill is unique and special to the firm, it is unclear if this core skill is of demand by others. It is of greater significance to find out the mechanism that cultivates core competence rather than to identify what the core competence actually is.

Negandhi and Prasad (1971) discovered that the management process is dependent not only on external environmental constraints but also on management philosophy. The difference between Eastern and Western management philosophies might be the barrier to applying Western strategic theories to the Chinese construction market. Knowledge of the Western market could perhaps be usefully combined with the Eastern principles that are embedded in the Chinese market

The literature review shows that though many studies had been done to combine the strategies from diverse bodies of knowledge, these strategies address diverse problems from various perspectives. Zhang (2003) found that the problem is foreign firms do not have a systematic framework to help them to be competitive in China. If

management philosophy determines management process (Negandhi and Prasad, 1971), foreign firms from developed countries may be adopting a Western management paradigm, which is different from Eastern management philosophy, to operate in China. Though previous study (Teo, 1997) considered combining strategies from both western and eastern origin in her research, there is no integrated framework based on the western business strategy, Chinese military strategy and social network strategy for foreign construction related consultancy firms that are operating in China. It is important to have an integrated framework because a foreign (non-Chinese) firm operating in China should not just adopt Western management philosophy. This firm has to interact with Chinese firms, e.g. clients, consultants, contractors and suppliers, and the authorities who are imbued with Chinese philosophy. The proposition of this study is that foreign firms that practise an integrated Western and Chinese management philosophy are more likely to be competitive in China. It is hypothesized that foreign construction related consultancy firms should adopt a combination of generic, military and network strategy to achieve higher level of competitiveness in China. The specific research hypothesis is refined in section 3.6.

2.7 Summary

This chapter identifies the gaps in knowledge on strategic management with particular reference to China. It is found that there is no integration of Eastern and Western thinking to address competitiveness issues for foreign firms operating in China. This

research proposes to integrate Sun Tzu's military principles, Porter's business strategies and network strategies to fill the knowledge gap.

In the next chapter, Porter's generic strategies, Sun Tzu's *Art of War* and the Network Theory of Embeddedness will be further reviewed to identify the feasibility of integration and thereafter, be included in the theoretical framework of this study.

CHAPTER 3 CONCEPTUAL FRAMEWORK FOR FOREIGN FIRMS TO ENHANCE COMPETITIVENESS IN CHINA

3.1 Introduction

In Section 2.6, the gap in knowledge is identified as the lack of an integrating framework to combine the known strategies of both Western and Chinese origins. To help foreign firms be more competitive in China, a conceptual framework is proposed in this chapter. The conceptual framework integrates Porter's (1980) generic strategies on competition, the three strategies from Sun Tzu's Art of War and the network strategy.

3.2 Porter's competitive strategy and value chain

3.2.1 Concept of business competitiveness

Porter's framework for competitive strategy is one of the most widely accepted business planning models (Pearce and Robinson, 1994). Porter (1980) argued that the generic strategies he proposed would enable a company to achieve a competitive advantage and outperform the other companies in the same industry. Porter (1980) claimed that to succeed in business, a firm needs to adopt one of two generic

competitive strategies – low cost or differentiation. These two basic types of competitive advantage should be combined with the scope of activities that a firm seeks to achieve (broad vs. narrow focus) (see Figure 2.2). Although four quadrants are used to depict Porter's (1980) model, he argues that there are usually three generic strategies for achieving above average performance – cost leadership, differentiation and focus. The focus strategy is further divided into two segments – cost focus and differentiation focus.

With a cost-based strategy, a firm can improve its competitive stance by lowering its production and marketing costs. In Male and Stocks' (1991) view, cost leadership requires management to focus its attention on competing based on low cost. This necessitates that systems and procedures be directed totally towards controlling cost. On the other hand, a firm may pursue a strategic advantage by differentiating its products and services from those offered by competitors. By providing unique and innovative products and services combined with creative marketing, a firm can create and nurture strong brand recognition and customer loyalty. Finally, a company may obtain a strategic advantage by choosing to specialize and focus on a niche market instead of competing broadly in the market. Focus could also be defined as scope of competition, which refers to a firm's decision on the breadth when developing competitive advantage (Kale and Arditi, 2002).

The value chain (Figure 2.3) is the tool to analyze the activities of firms. The value

chain of each individual firm is derived from multiple discrete activities that range from designing, producing, marketing, delivering to supporting its product. Each of these activities can add on to a firm's relative cost position and create a basis for potential sources of differentiation.

3.2.2 Activity variables

In Porter's (1985) view, the two approaches to gain cost advantage are the control of cost drivers and the reconfiguration of the value chain. Porter claimed that differentiation stems from the unique creation of buyer value. A firm can enhance its differentiation in two basic ways. It may become more unique in performing its existing value activities or it may reconfigure its value chain in some way to enhance its uniqueness. The variables shown in Table 3.1 form the core of the approaches to achieve cost leadership and differentiation, and are used to provide the theoretical foundation for this study.

Table 3.1 Competitive strategies and operationalization of strategies

Strategy	Operationalization of strategies
Cost leadership	1. Controlling scale: Gain the appropriate type of scale Set policies to reinforce scale economies in scale-sensitive activities Exploit the types of scale economics that are favourable to the firm Emphasize value activities driven by the types of scale economies where firm has an advantage 2. Controlling learning Manage the learning curve Keep learning proprietary Learn from competitors 3. Controlling the effect of capacity utilization 4. Controlling linkages Exploit cost linkages within the value chain Work with suppliers and channels to exploit vertical linkages 5. Controlling interrelationships Share appropriate activities Transfer know-how in managing similar activities 6. Controlling integration Examine systematically possibilities for integration and de-integration 7. Controlling timing Exploit first-mover or late-mover advantage Exact time to purchase in the business cycle 8. Controlling discretionary policies Modify expensive policies that do not contribute to differentiation Invest in technology to skew cost drivers in the firm's favour Avoid frills 9. Controlling location Optimize location 10. Controlling institutional factors Do not take institutional factors as a given 11. Procurement and cost advantage Tune specifications of purchased inputs to meet needs more precisely Enhance bargaining leverage through purchasing policies Select appropriate suppliers and manage their costs 12. Reconfiguring the value chain A different production process Differences in automation Direct sales instead of indirect sales A new distribution channel A new raw material Major differences in forward or backward vertical integration Shifting the location of facilities relative to suppliers and customers New advertising media 13. Reconfiguring downstream The efficiency of the downstream The bargaining power of the downstream
Focus	1. The well-chosen segment of an industry 2. Employing a different and tailored value chain 3. Target segment is associated with a key cost driver 4. Innovative segmentation of an industry
Differentiation	1. Enhance the sources of uniqueness Proliferate the sources of differentiation in the value chain Make actual product use consistent with intended use Employ signals of value to reinforce differentiation on use criteria Employ information bundled with the product to facilitate both use and

Strategy	Operationalization of strategies
	signalling 2. Make the cost of differentiation an advantage Exploit all sources of differentiation that are not costly Minimize the cost of differentiation by controlling cost drivers, particularly the cost of signalling Emphasize forms of differentiation where the firm has a sustainable cost advantage in differentiating Reduce cost in activities that do not affect buyer value 3. Change the rules to create uniqueness Shift the decision market to make a firm's uniqueness more valuable Discover unrecognized purchase criteria Preemptively respond to changing buyer or channel circumstances 4. Reconfigure the value chain to be unique in entirely new ways A new distribution channel or selling approach Forward integration to take over buyer functions or eliminate the channels Backward integration to control more determinants of product quality Adoption of an entirely new process technology

Source: Porter (1985)

3.2.3 Applications of Porter's frameworks

By analyzing the trends in the construction industry, Betts and Ofori (1992) suggested that it is necessary for firms to turn from tactical and short-term planning to long-term strategic planning. Strategic planning techniques, such as Porter's five-force framework, generic strategy and value chain, are vital for the survival and progress of construction enterprises of all types.

Winch and Schneider (1993) set up a model for UK architectural practices combining generic strategy (Porter, 1980) and Maister's (1986) strategy model for professional practices. The four strategies suggested by the authors are strong delivery, experience, ambition and ideas based on the parameters of project complexity and the client's quality preference.

Veshoshy (1994) developed an analytical framework to be applied to the design segment of the A/E/C industry in the USA using Porter's (1985) generic strategies. He found that explicit business strategies appeared to be superior to strategies resulting from autonomous managers.

Jennings and Betts (1996) defined four new generic strategies (execution, expertise, efficiency and experience) for private quantity survey (PQS) practices by combining Porter's (1985) generic strategies and Maister's (1986) three benefit elements in terms of expertise, experience and efficiency. The authors stated that the new model contributed to classifying and forecasting the way PQS practices compete, as well as how they use information system/ information technology to help achieve their goals. The variables in each generic strategy are typical practice size, IT-use level, strategy elements and staff structure.

Pinto et al. (2000) established a customer-based project-success metrics for projects in Finland. The authors suggested that a clear understanding of the approaches to create value to the customer's business cycles helps the firms to compete more effectively. It is the activities in the value chain that contribute to superior products and service.

Ormanidhi and Stringa (2008) explored the applicability of Porter's generic strategy model. They compared the similarities and differences between Porter's (1980, 1985) model and other frameworks like the structure-conduct-performance model, industrial

organization theory, game theory, resource-based perspective and market process economics. They found that Porter's model is popular, well-defined, structured, feasible, clear, simple and general, and it complements the game theory and resource-based perspective. The application of Porter's generic strategy model will "provide the useful basis for further investigation along the lines of a broad contextual approach based on the game theory or a more detailed intra-firm approach based on the resource-based perspective or the knowledge-based variant" (Ormanidhi and Stringa, 2008, p.43)

3.2.4 Inadequacies of the generic competitive strategies

Although Porter's theory is acclaimed for its simplicity and well know, there are also plenty of criticisms. The inadequacies of the generic strategies are reviewed below.

(i) Porter (1980) argued that cost advantage and differentiation are fundamentally two very different concepts in competitive advantage; thus firms should only choose one of the two positions. A firm pursuing hybrid strategies will be "stuck in the middle". However, Johnson and Scholes (1993) stated that the pursuit of more than one generic strategy simultaneously is viable, and further studies have shown that firms adopting the hybrid method do not seem to face the situation Porter had described (Miller and Dess, 1993). There are no lasting or enduring generic strategies (Baden-Fuller and Stopford, 1992).

(ii) Porter's works were also criticized by Minzberg (1990) and Wit (1997) for their disconnection between thinking and action, and between strategic formation and implementation. Porter appears to consider a "proper planning process" as the link between thinking and implementing (Porter, 1987), but he did not consider the emergent issues in the implementation of the planned strategies. The strategies and capabilities created and nurtured in reality also contribute to the strategic knowledge.

(iii) Porter's theories were based on the economic situation in the 1980's, the age characterized by strong competition, cyclical developments and relatively stable market structures. Hence, Porter's models might be insufficient to explain or analyze today's dynamic changes, especially the issues resulting from globalization. Managers today might have more means to influence competitive forces besides the traditional thinking in Porter's world, which was largely to achieve a better competitive position against other players. The attitude towards competition may have changed from one that looked at it as an outcome through conflict to one that sees it as creating value through co-development. Developed markets are recognizing the limitations of competitive perspectives and are moving towards cooperation (Fellows, 1993).

(iv) Lado et al. (1992) argued that Porter did not address the internal mechanisms by which a company converts the influence of a challenging

external environment into useful internal abilities. They proposed that setting up a relationship between organizational activities and core competence may be useful.

Some of the criticisms about Porter's generic strategies may be weakened if the three generic strategies are to be understood from a systemic perspective. Considering the linkage set up by Ard-Pieter de Man (1997) (Figure 3.1), the gap between planning and implementation may be filled by understanding the generic strategy along with value chain analysis. The firm can combine its competences and resources in certain activities in the value chain (Porter, 1985) and create a competitive advantage that can underpin a certain position in the market (a low-cost, differentiated or focused position). The practices to achieve these three generic strategies in the construction industry are reviewed in Chapter 4 (see Section 4.2 to Section 4.4).

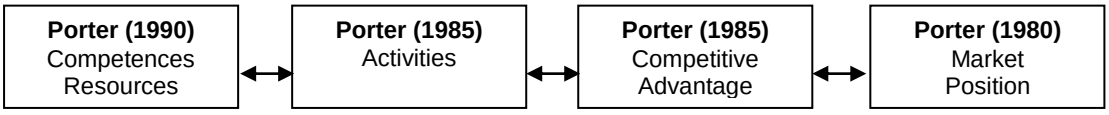


Figure 3.1 From resource to market
Adopted from Ard-Pieter de Man, 1997

Although Porter's generic strategies are criticized by other researchers, they remain appropriate for integrating firms' competitiveness for the reasons below.

(i) Firstly, Porter's generic strategies are relevant because this study focuses on the effective strategies that enable a firm to achieve competitiveness. Mintzberg (1998) who grouped strategic knowledge into ten schools: design

school; planning school; positioning school; entrepreneurial school; cognitive school; learning school; power school; cultural school; environmental school; and configuration school. The first three schools are prescriptive schools concerning how strategies should be formulated, and the following six schools consider specific aspects of the process of strategy formulation are named as descriptive schools (Mintzberg, 1998). Porter's generic strategy belongs to the "positioning school" which concerns with the actual content of strategies and selection of strategic positions in the economic marketplace.

(ii)The intention of this research is to test the effectiveness of various strategies in certain contexts rather than the exclusive adoption of each of these three strategies from Porter. Therefore, the contribution of the generic strategies to this research is the provision of various types of strategies, logically distinguishing one group of strategy from the other, for setting up the conceptual framework. The use of Porter's generic strategies is consistent with other researchers (Solberg and Durrieu, 2008, p.526) who stated that "we adopt this taxonomy in our framework (to study the strategy development in the international market), since it captures important dimensions of competitive advantages and thereby logically distinguishes one group of strategies from other groups". Furthermore, Porter's framework overlaps with other typologies proposed by other researchers. For example, Porter's differentiation strategy resembles Miles and Snow's (1978) prospector strategy, and Porter's cost

leadership strategy is similar to Miles and Snow's defender as well as Hambrick's (1983) and Dess and Davis's (1984) cost leadership strategies. Porter's focus is very much like Miller and Friesen's (1986) niche innovator strategy (Solberg and Durrieu, 2008).

(iii) In Mintzberg's (1990) view, Porter's competitive strategy is one of the most important strategies for business. Its strong capability in business strategy planning has been broadly accepted (Pearce & Robinson, 1994). At the same time, Porter's competitive strategy is a rather rational and clear approach to formulating strategy (Ard-Pieter de Man, 1997). In the construction industry, it has been used widely by many researchers to plan the strategies of construction firms, architecture firms and quantity surveying firms. It is therefore reasonable to include Porter's generic strategy as one of the components of the framework to investigate competitiveness of foreign firms in China.

(iv) Porter's model for evaluating a firm's competitive behaviour is popular in Western countries. For example, Miller and Dess (1993) found that over the period of 1986-1990, Porter's 1980 work was referred to in almost half of the papers published in the Strategic Management Journal. Thus, it is well established and has been used in studies on internationalization strategy by Western researchers (Solberg and Durrieu, 2006). It is reasonable to use

Porter's model to analyze at least the partial performance of Western firms.

(v)Porter's generic competitive strategies constitute one part of Porter's models, and the other models from Porter provide the tools to analyze the competitive strategies of firms. The five-forces framework is used to identify the three generic competitive strategies to achieve a defendable competitive position (Wit, 1997). In addition, the value chain helps to identify the activities and processes to improve a company's performance. The well-defined structure of Porter's model provides some criteria or benchmarks by which firms can be easily analyzed and compared in ex post situations (Ormanidhi and Stringa, 2008).

Based on the above analysis, Porter's (1985) model of generic competitive strategy is chosen as one of the components in the conceptual framework in this research.

3.3 Sun Tzu's Art of War

3.3.1 Concept of Sun Tzu's Art of War

Sun Tzu's Art of War is probably the oldest military book published in Chinese, and the principles that Sun Tzu advocated continue to be of great value to many business operations today. Sun Tzu's Art of War is set in the military context in 400 BC, when conflicts between different parties in China were furious and frequent. The philosophy

developed by Sun Tzu in the Art of War outlines specific strategies to overcome conflicts while viewing the world as a complete and interdependent system that must be preserved (Low and Tan, 1995). The Art of War consists of 13 chapters, and many researchers have translated them to offer the closest meaning to the Chinese literary writing (see Griffith 1963, and Lee et al., 1998). When business managers consider the principles of the Art of War in their strategic decision-making, they will be able to create numerous strategies and methods in solving problems.

To understand the original principles of Sun Tzu's Art of War, different researchers' understanding of the13 chapters and Low and Yeo's (1994) summary of the principles of each chapter are presented in Table 3.2. A Chinese saying "商场如战场" ("the marketplace is a battlefield") captures the difficulties faced by business managers when operating in the marketplace. In the business world, many factors influencing competition, such as culture, policies, resource and rivalry, must be considered. Sun Tzu advocated that in times of warfare, countries need to check their weapons, armies, terrain, logistic support and so on. Sun Tzu's Art of War, seen as a valuable tool that is characterized by Eastern cultural elements, has thus been applied to the business arena by many researchers (examples are: Krause, 1995; Mcneilly, 1996 and Michaelson, 2001). The relevant strategies that represent the dialectical perspective and are appropriate for combining with other strategies to set up the framework are described in Section 3.2.4.2.

Table 3.2 Sun Tzu's 13 chapters and some of the main precepts

Chapter		Some of the main precepts[5]
I	Laying plans[1] The calculations[2] Initial estimations[3] Detail assessment and planning[4]	- All warfare is based on deception. Therefore, when capable, pretend to be incapable; when active, inactive; when near, make the enemy believe that you are far away; when far away, that you are near. -Hold out baits to lure the enemy; feign disorder and strike him. When he has the advantageous position, prepare against him; when he is strong, avoid him. If he is prone to choleric temper, irritate him.
II	Waging war[1] The challenge[2] Waging war[3] Waging war[4]	-Victory is the main objective in war. If this is long delayed, weapons will become blunt and the ardour of the soldiers will be dampened, -Thus, while we have heard of stupid haste in war, we have not yet seen a clever operation that was prolonged. History has shown that there has never been a country benefiting from prolonged warfare.
III	Attack by stratagem[1] The plan of attack[2] Planning offensives[3] Strategic attack[4]	-Fighting to win one hundred victories in one hundred battles is not the supreme skill. However, to break the enemy's resistance without fighting is the supreme skill. -A general is like the spoke of a wheel. If the connection is tight and complete, the wheel will be strong and so will be the State; if the connection is defective, then the State will be weak.
IV	Tactical dispositions[1] Positioning[2] Military disposition[3] Army[4]	-Invincibility lies in one's own hands, but the enemy's vulnerability is of his own making. Thus, those skilled in war can make themselves invincible but the enemy's vulnerability is provided only by the enemy himself. -What the ancients called a skilful fighter is one who not only wins but wins with ease. He wins by making no mistakes. Making no mistakes means already having established the certainty of victor and conquering an enemy who is already defeated.
V	Energy[1] Directing[2] Strategic military power[3] Forces[4]	-Generally, in battle, use the direct methods to engage the enemy forces; indirect methods however are needed to secure victory. -A skillful commander conserves energy from the situation instead of wasting his mean. He selects his men according to their talents and uses them to exploit the situation.
VI	Weak points and strong[1] Illusion and reality[2] Vacuity and substance[3] Weaknesses and strengths[4]	-Military tactics are similar to water, for just as flowing water runs away from high places and speeds downwards, so an army avoids the strong enemy and strikes at the weak one. -By discovering my enemy's dispositions and at the same time concealing mine from him, I can concentrate my forces while he must divide his. Knowing his dispositions, I can pit my total strength against a part of his.
VII	Maneuvering[1] Engaging the force[2] Military combat[3] Military maneuvers[4]	-War is based on deception. Move only if there is a real advantage to be gained. Creates changes in the situation by dividing or concentrating your forces. -Nothing is more difficult than directing maneuvers. The difficulty lies in turning the devious into the direct, and misfortune into gain.
VIII	Variation of tactics[1] The nine variations[2] Nine changes[3] Adaptability[4]	-There are some roads which we must not follow; some enemy troops we must not fight; some cities we must not attack; some grounds we must not contest; even some orders from the ruler which we must not obey. -it is a principle of war that we do not assume the enemy will not come, but instead we must be prepared for his coming; not to presume he will not attack, but instead make our won position unassailable.

IX	The army on the march[1] Moving the force[2] Maneuvering the army[3] Movement and development of troops[4]	-When positioning an army to observe the enemy, cross over the mountains and stay close to the valleys. Position yourself on high ground with a wide view. -Nourish your soldiers well and build up their internal strength so that they are free of hundreds of diseases, and this will ensure victory.
X	Terrain[1] Situational positioning[2] Configurations of terrain[3] Terrain[4]	-Ground which is disadvantageous for both the enemy and ourselves is inconclusive ground. In such ground, do not advance to take the enemy's baits but instead seek to lure him forward by your retreat. -Know your enemy, know yourself and your victory will be undoubted. Know Earth, know Heaven and your victory will be complete.
XI	The nine situations[1] The nine situations[2] Nine terrains[3] The nine battlegrounds[4]	-The changes of the nine varieties of ground gives varying advantages of attacking and defending; and the behavior of the soldiers are matters which must be studied seriously. Speed is the essence of war. Take advantages of the enemy's lack of preparation; move by using unexpected routes and attack where he has made no defence.
XII	The attack by fire[1] The fiery attack[2] Incendiary attacks[3] Attacking with fire[4]	-Therefore, to win battles and make conquests and to take over all the subjects, but failing to rebuild or restore the welfare of what one gained would be a bad omen. -An angry man can latter become happy, a resentful man become pleased, but a kingdom once destroyed can never be resorted nor the dead be brought back to life.
XIII	The use of spies[1] The use of intelligence[2] Employing spies[3] Intelligence and espionage[4]	-It is important to find out who are those sent by the enemy to spy on you. -Only the one who is wise and sagely, benevolent and just, can use secret agents. Only he who is sensitive and subtle can get the truth of their reports. -The enlightened ruler and the wise general can subdue the enemy whenever they move and they can achieve superhuman feats because they have foreknowledge.

Source: 1: Lionel Giles (1910); 2: R.L. Wing (1988); 3: Ralph D. Sawyer (1996); 4: Chow-Hou Wee (2003); 5: S.P. Low and Yeo (1994)

As the focus of this research is on competitive strategic thinking and management applications, Sun Tzu's military strategies is organized in a format that it is applicable to modern strategic management. The application of Sun Tzu's military principles to business and management paved the way for identifying appropriate principles to achieve the objective of this research. At the same time the applications make it possible to compare and integrate business theories with Sun Tzu's principles, contributing to the conceptual framework for this research.

3.3.2 Applications of the Art of War

There are a number of studies, in Chinese and English as well as other languages, which applied Sun Tzu's Art of War strategies to the business and management environment. These are reviewed below.

Foo and Grinyer (1994) showed how the Art of War is a relevant corporate strategy for firms located in the ASEAN countries. Sun Tzu's principles were organized into their strategic planning framework, which consisted of the strategic process, critical success factors and performance consequence. The study related metaphorically relevant segments of Sun Tzu's Art of War in presenting the insights gained from an empirically based study of strategic planning. The researchers identified strategic planning as much more than an annual exercise; it is the art of continuous shaping and positioning of an organization in the struggle in an often hostile environment.

Wee et al. (1995) presented Sun Tzu's Art of War's comprehensive model for strategies that comprised the following: situation appraisal, formulation of goals, formulation of strategies, evaluation of strategies, implementation of strategies, and strategic controls. The authors used Sun Tzu's principles to design a "How to" model to assist in managerial or business decision making with regard to the choice, development and application of a strategy in various situations.

Low and Tan (1995) made a comparative study of Sun Tzu's Art of War and the marketing mix paradigm to identify the convergence of Western marketing strategies and Sun Tzu's thinking. The knowledge of Sun Tzu is applied to certain strategic management principles to produce product strategy, place strategy, promotion strategy, price strategy, power strategy, public relations strategy, personnel strategy, physical facilities strategy and process management. They found that the merger of Western marketing mix concepts and oriental thinking may be used to outmanoeuvre competitors in the market.

McNeilly (1996) set up the model for managers to create strategies and achieve lasting success by extracting six principles from Sun Tzu's Art of War. To get to the heart of Sun Tzu's philosophy and explain it in a holistic fashion, McNeilly did not use all the 13 chapters in the book and instead used the principle-approach. The six important principles are: to capture the market without destroying it; avoid competitor's strengths and attack their weaknesses; use foreknowledge and deception to maximize the

power of business intelligence; use speed and preparation to swiftly overcome the competition; use alliances and strategic control points in the industry to “shape” one’s opponents and make them conform to one’s will; and develop one’s character as a leader to maximize the potential of employees.

Krause (1996) presented a summary of Sun Tzu’s principles for business success. The major business principles are: learn to fight; show the way; do it right; know the facts; expect the worst; seize the day; burn the bridge; do it better; pull together; and keep competitors guessing. People in an organization have to face all kinds of competition. These ten principles formed and became the foundation for future competitive success.

Lee et al. (1998) devised business management strategies using Sun Tzu’s Art of War. The 13 chapters of Sun Tzu’s Art of War were analyzed to identify the equivalent business management strategies through a questionnaire survey. The intention of the application was to study how management philosophy can be applied to the prescriptions of Sun Tzu as well as to draw parallels between the principles underlying the behaviour advocated by Sun Tzu and the situation of top management.

Based on Sun Tzu’s Art of War, Tan et al. (1998) proposed that the various types of battleground as discussed in the Art of War be classified into three strategic dimensions: ease of entry, reversibility and fit. Based on these dimensions, the authors identified seven types of markets with specific characteristics for small and

medium-sized enterprises (SMEs). Each of these markets is analogous to a specific type of battleground described in the Art of War. The rules proposed by the authors are: be the first mover and pre-empt the competition by erecting entry barriers; avoid entrapping grounds characterized by easy entry and low reversibility; concentrate limited resources on attacking the weaknesses of competitors; adopt a niche market strategy for the market that is neither easy to enter nor exit; direct efforts towards creating competitive advantages; follow free-riding strategy where competitors do not have good market-company fit; and form alliances to have better market-company fit than competitors.

Wong et al., (1998) applied Sun Tzu's Art of War to international business, using China as the model. The interaction between China's industry entities and foreign managers seeking to make a profit was compared to the dynamics of warfare between countries in the Art of War. Authors identified Sun Tzu's "Five Constant Factors" (a formula for knowing themselves) and "Seven Comparisons" (a formula for knowing their adversaries) to be appropriate for China's complex and risky international business environment.

Hawkins and Rajagopal (2005) constructed a framework integrating Sun Tzu's strategies with the project life cycle context to show the correlation between the various aspects of the military strategies and the fundamental building blocks of project management. Though Sun Tzu's principles were linked with the tactics in executing

projects, the authors stated that waging war would be a lot simpler than some of the challenges management faced.

Besides research by academia, Sun Tzu's Art of War is used widely by many Chinese entrepreneurs. One example is Zhang Ruimin, the CEO of Haier Group (The Straits Times, 2005). It was reported that Zhang Ruimin read old treaties that included Sun Tzu's Art of War to help build his company to become one of the largest MNCs from China. Its prowess includes sponsoring the Beijing Olympics Games in 2008, and buying up US brand names such as Maytag and Hoover. Zhang Ruimin said that he uncovered his business secrets by using Sun Tzu's maxims: "victory may be produced out of the enemy's own tactics" and "you can be sure of succeeding in your attacks if you only attack places which are undefended".

3.3.3 Inadequacies of the Art of War

Besides the wide applications, Sun Tzu's Art of War is also criticized. The criticisms of the military principles usually arise from doubts about their application in a non-military area; doubts about the differences between the ancient and modern age; and doubts about the scientific implications of the principles.

(i) The application of military principles in business management is based on the assumption that marketing and war are close analogues. The counter-arguments are that war is too different from business to apply the

principles derived from warfare to business. There is a large difference between ancient warfare and the modern marketplace, even though the business world is often perceived to be like a battlefield. McCormick (2001) argued that war is a poor metaphor for business primarily because war is a win-lose proposition, while more and more businesses are finding success by creating integrative, win-win transactions. The tactics used in a one-time transaction are inappropriate for establishing long-term strategies. As a military strategy, the Art of War involves a one-time and a win-lose transaction, which is the general characteristic of military strategy. When a war is waged, forces and resources are concentrated on securing a win. However, in current business contexts, the economic and business planning frameworks and priorities have shifted from the short-term and tactical to the long-term and strategic (Betts and Ofori, 1992). A one-time win will not be able to sustain the survival and development of the firm.

(ii) Metaphors are commonly used in Chinese literature, and there is no exception to the Art of War. Pursuing indirect communication and linkages among ideas is the traditional Chinese approach to strategic thinking, but a big barrier to business applications. Foo (2007) stated that pre-knowledge in the areas of art, psychology and sociology is the prerequisite for understanding the ideas of Eastern strategic management. Therefore, greater demands are required of those who want to understand and apply these principles. This may

be difficult for the non-Chinese managers. McCormick (2001) argued that:

> *Sun Tzu gives his most absolute statements about warfare in the first chapter stating, 'All warfare is based on deception'. Deception may well be the primary thesis of this book and has been noted as a central theme by other management scholars (p. 285).*

However, based on Chinese literary knowledge, Sun Tzu's "deception" should not be translated into the actions of "cheating" or "fooling". On the contrary, in Sun Tzu's context, "deception" is about achieving goals through deliberate and smart strategies, as well as indirect attacks. It is insufficient to look upon the Art of War as a textbook. The experiences and knowledge embedded in the context where the principles are created must also be considered.

(iii) It is not easy to extract and structure Sun Tzu's principles. This may be attributed to the way events are recorded by the Chinese. Historical facts are usually deliberately recorded as novels, art or stories (William and Jae, 2007), and the words used to interpret the process are circuitous, with many "detours". Led by dialectical thinking, a principle may be used to explain diverse situations to a certain degree. Though French sinologist Jullien (2000) found that indirect communication yield deeper and subtler meanings compared to the more direct and frontal Western approaches in communication, it also brings some difficulties in application.

Though there are inadequacies in Sun Tzu's Art of War, it is not reasonable to ignore the valuable principles that can be found in Sun Tzu's ideas. The reasons are given below.

(i) Sun Tzu's Art of War is popular in both Eastern and Western countries for studies in strategic management research. Crainer and Stuart (1998) looked upon Sun Tzu as one of the 50 management gurus. The Chinese traditional culture that is embedded in Sun Tzu's principles makes it an appropriate tool for analyzing behaviours in the context of the Chinese market.

(ii) Besides the strategies in the planning process, Sun Tzu also provided the knowledge to deal with the elements that are excluded from the planning process owing to the unpredictability of the environment. This stream of principles is valuable to this research, considering its role in dealing with uncertainty and dynamics. At the same time, these principles led by the Chinese traditional culture can be used to represent the knowledge nurtured in China.

(iii) While it is acknowledged that business and military have different context, the numerous studies which applied Sun Tzu's ideas in the non-military setting including construction management (eg. Low and Yeo (1994), Low and Tan (1995) and Low and Teo (2005)) show that it is feasible to be used to study construction consultancy practices in the construction industry.

Based on the above reasons, Sun Tzu's Art of War is chosen as one of the components in the conceptual framework in this research. To ensure that the knowledge derived from Sun Tzu's work is not negatively influenced by its shortcomings, discussed earlier, in this study the principles of Sun Tzu's Art of War are strictly cited from authorized translations and the applications of Sun Tzu's principles are based on publications in non-military areas.

3.3.4 Three strategies from the dialectical perspective of the Art of War

As discussed in Section 2.3, Chinese military strategy appears to be influenced by Confucianism and Taoism. In this section, by using previous works on applications, the strategic management principles of Sun Tzu's Art of War are explained.

Sun Tzu's ideas are explained in two streams of principles based on the following three implications from the dialectical perspective (see Section 2): (i) victory is both "predictable" and "unexpected"; (ii) strategy is both "designed before the war" and "created during the war"; and (iii) winning a war is to win both "before" and "during" the war.

Holding a dialectical attitude towards the environment, Sun Tzu believed that a win can be predicted by calculation but can go out of focus when disturbed by changes or inconsistencies. Sun Tzu proposed that "A victorious army wins its victories before

seeking battle"; and "the elements of the art of war are measurement, estimation, calculations, comparisons and chances of victory". Therefore, Sun Tzu did not completely depend on deliberate planning. In his eyes, changes can also bring about a win, for they provide opportunities to exploit rather than problems to overcome. Sun Tzu's Art of War also teaches the strategies to use to secure a win when faced with changes in an unexpected situation. Sun Tzu emphasized: "Of the five elements, none is always predominant; of the four seasons, none lasts forever; of the days, some are long and some short, and the moon waxes and wanes ..." (Griffith, 1963, p.101). Hence, one can capitalize on a trend and turn it to one's favour and minimize negative impacts by being adaptable to changes in the operating environment. The principles to create a win in a dynamic environment as proposed by Sun Tzu were applied to the business arena as swiftness in execution, adaptability in manoeuvres, deceptiveness in actions and strategies, anticipation of the changes in environment and adaptability to changes (Wee et al., 1991; Low and Yeo, 1994). Based on these principles, three Art of War strategies, swiftness, adaptability and intelligence, are included in the theoretical framework of this study.

3.4 The Art of War and business competitiveness

3.4.1 Swiftness strategy

Sun Tzu stated that:

> *"Speed is the essence of war; capitalize on the unpreparedness of the enemy; travel by the unexpected routes; and attack those places where he does not take precautions."*

The above suggests the importance of swiftness in execution. Once the plan is formulated and agreed upon, it has to be executed swiftly so that it will not be leaked to the rivals. Sun Tzu's swiftness strategy involves three aspects: timing, synergy and speed (Wee, et.al., 1991). First, Sun Tzu stated that "when the strike of the falcon breaks the body of its prey, it is because of correct timing". Choosing the right time to enter the market to "attack" one's rivals is a prerequisite for swiftness. It is quite similar to Kotler's (1997) viewpoint that the implementation of a firm's strategy should be swifter than its competitor, shortening the whole time by speedy execution (Arditi et al. 1985). Second, Sun Tzu's statement that "when torrential water pushes boulders, it is because of its momentum" suggests a synergy of diverse actions to overwhelm the competitor leaving him with no time to think, respond and develop an effective defence. Construction firms that achieve innovative products and processes through active collaboration (Hastak et al., 1993) are an example of this. Third, Sun Tzu asserted that:

“when victory is long delayed, the ardour and morale of the army will be depressed. When the siege of a city is prolonged, the army will be exhausted. When the army engages in protracted campaigns, the resources of the state will be impoverished.” This third situation of “swiftness” refers to being “speedy” in execution. In the construction context, it relates to completing a project within the shortest time.

The relationship between Sun Tzu’s swiftness and the construction industry can be seen from the following extract from Low and Yeo’s (1994, p.14) work:

> *“Timing is vital for the property developer in so far as the launching of a project is concerned. The viability of the project could be dependent to a large extent on whether the development is launched during a recession or an upturn in the economy. Timing is likewise important to the contractor. He should complete his projects in as short a time with as low a cost as possible without compromising on quality or safety. The advantages which may be derived therefrom can include reduced construction costs, bonuses for early completion, good track record and an enhanced chance of securing the next contract”.*

3.4.2 Adaptability strategy

While Sun Tzu advocated swiftness in execution, he forbade blind assault and instead advocated adaptability. Sun Tzu’s adaptation strategy is shown in his principle:

"Just as water shapes itself according to the ground, an army should manage its victory in accordance with the situation of the enemy. Just as water has no constant shape so in warfare there are no fixed rules and regulations; therefore, do not repeat the tactics that won you a victory, but vary them according to the circumstances; effective strategies must constantly change according to the situation of the enemy."

Being adaptable is necessary to bring the planning to reality, because even with detailed planning things may still go wrong. The field commander must be sharp to recognize that the field situation is inconsistent with the information or assumptions made at the planning stage. He should thus change the war strategy accordingly. In the construction industry, calls have been made for firms to create flatter and broader adaptive structures. The establishment of an adaptive culture helps to reduce employees' resistance to changes (Alas and Sun, 2007). In addition, during the change process, strong support from top management, communication and commitment among employees, as well as a compensation and incentive system to facilitate changes, are necessary to bring about change (Price and Chahal, 2006).

In Low and Yeo's (1994) view, a construction firm can achieve adaptability by offering a flow of innovative ideas on all fronts and being equipped with a dynamic organization structure. To move ahead of its competitors, a construction firm should look for opportunities to adopt new construction methods and technology. It should also think

creatively by viewing new trends positively. The firm must be able to capture at all times any opportunity that arises from a changing environment or any other factor.

3.4.3 Market Intelligence strategy

According to Sun Tzu, foreknowledge, which can be obtained by systematic intelligence, is important to achieve victory. Sun Tzu's emphasis on intelligence can be seen in the following statements:

> *"One must not enter into any alliance with the rulers of neighbouring states without knowing their military motives and designs. One must not move troops without being familiar with the conditions of mountains, forests, passes, swamps, marshes and so on. This foreknowledge can be elicited and obtained from men who have knowledge of an enemy's situation."*

From Sun Tzu's perspective, with intelligence, one should have both the antenna to "touch" the information as well as the internal system to keep the information. This is also consistent with Low and Yeo's (1994) suggestion for construction firms. Information may be acquired through personal contacts, seminars, mass media and payments to a person or group of persons for the information.

The dynamics and complexity of the operating environment call for skills in selecting, collecting, interpreting and distributing information. For example, construction firms

could set up channels with agents, clients and suppliers to smoothen the process of project development and execution in China (Ling et al., 2005). To set up a system to deal with market information, firms need to have the ability to process and manage information. Information technology infrastructures, human resources and IT-enabled intangibles, such as customer orientation, knowledge assets and synergy, (Bharadwaj, 2000) are also important channels for acquiring market intelligence.

3.5 Network strategy

3.5.1 Concept of Network strategy

Granovetter's (1985) Network Theory of Embeddedness suggests that an economic action is embedded in a network of social relationships. In Granovetter's (1985) view, a firm should look beyond profit and market relationships, and concentrate on social relationships. Actors do not behave or decide as atoms outside a social context but are instead embedded in concrete, on-going systems of social relations. The pursuit of economic goals is usually accompanied by that of non-economic goals such as sociability, approval, status and power.

Granovetter (1985) argued that a pure market does not exist because there is evidence of social structural influences on market behaviour. Examples include trustworthy behaviour due to group pressure, repeated personal contacts giving rise to

courtesy and consideration for the other party, expectations of repeat business which discourage efforts to seek narrow advantage, fear of ostracism among peers, and the importance of reputation. He, therefore, proposed the Network Theory of Embeddedness in which he suggested that economic transactions also include social obligations, kinship obligations, knowledge of the identify of transactors, and past relationships between transactors.

3.5.2 Studies in Network strategy

Social network studies emphasized either the structural or relational aspects of networks (Granovetter, 1985). This section reviews studies on the social network theory.

Granovetter (1973) broadly classified ties as being strong (i.e. family members and close friends) or weak (i.e. contacts who are not known well). This classification serves to explain the extent to which a firm can access resources. Strong ties are formed from relations that one already has. These relations are intense, frequent and possess informational resources. Granovetter (1973) associated these strong ties with a dense network structure. Weak ties are formed from relations with persons one is loosely connected to. As they operate in different networks, weak ties offer the advantages of providing access to heterogeneous sources of knowledge and information.

Burt (1992) studied the efficiency of networks and stressed that there are costs

associated with maintaining contacts. Redundant contacts carry the same information. Therefore, firms should aim to have non-redundant contacts that are complementary and do not overlap, so called “structural holes”. Structural holes are “disconnections between players in the arena” and they provide opportunities for information access, timing, referrals and control. According to Burt (1992) an efficient network structure is characterized by non-redundant contacts and brokerage opportunities.

Besides these studies which focused on the competence side of the relations, Coleman’s (1988) study emphasized the governance side of relations. Coleman (1988) related the structure of a network to the level of social capital which can emerge between network actors. Coleman (1988) pointed out that the benefit of dense networks is their potential with regard to the buildup of social capital. This social capital is not only a buildup of information but also facilitates the functioning of norms and sanctions which may form effective ways to coordinate a relationship.

The review of previous studies shows their emphasis on different properties of the network. Their findings are not contradictory, and they are valuable for different populations and purpose (Burt, 2004). While the structural holes theory (Burt, 1992) stress the importance of weak ties. Lin (1986) suggested that in China strong ties are more important than weak ties in accessing resources based on the Chinese traditional culture. This was confirmed by Bian et al. (2001). Rowley et al. (2000) realized that neither type is preferred as both have different qualities. The literature

shows that there is no single approach in network strategy.

The assessments and critiques to Granovetter's (1985) network theory further show that networks are influenced by other factors. Due to the strong focus on the structural elements (properties) of networks, the identification of relevant environmental conditions and how they influence the structure have generally been ignored by social network theorists (Ahuja, 2000). From Ahuja's (2000) perspective, social network literature offers only a partial account of the performance implications of alliance portfolios because it focuses on network ties while assuming away differences in the inherent attributes of actors. In addition, it relies on interpersonal relations involving emotional intensity and intimacy, which is not applicable to interfirm alliances (Rowley et al., 2000).

Based on the above review, several observations are made below.

(1) Studies on relational embeddedness examined the nature of dynamic relationships, while considering the strength of ties and the trust evolving between actors (Granovetter, 1973; Powell, 1990). Granvotter recognized that the strength of ties entails a linear combination of amount of time, reciprocal services, intimacy (mutual confiding) and the emotional intensity which characterize the tie (Granovetter, 1973).

(2) The knowledge from studies done on structure embeddedness highlights the actors' positions in the overall network structure by considering different properties: (i)

Structure holes (the absence of ties between actors) is suggested by Burt (1992) for actors to achieve profits. (ii) Centrality (the ability to access resources through indirect and direct links) is highlighted by Johannisson (1998) and Powell et al. (1996), and found that especially in strong networks (Krackhardt, 1992). (iii) Density, the extent to which actors contact each other (Burt and Raider, 2000). This property is further described using the strength and number of ties. Singh (2000) showed that in the information technology industry, entrepreneurs with more weak ties (i.e. contacts who are not known well) reported a higher number of opportunities identified than those with fewer. With more social contacts, firms usually are able to obtain more information and recognize more opportunities (Singh, 2000). At the same time, the relative availability of alternatives determines the extent to which the firm depends on its partners, the switching costs of changing partners, and the firm's bargaining powers (Yan and Gray, 1994).

(3) The intention of the governance of a network is to enhance coordination and reduce behavioural uncertainty among exchange parties (Jones et al., 1997). The governance of the network relies on implicit and open contracts (Larson, 1992). Implicit contracts are built on mutual trust, which is often cited as a critical element of networks to enhance the quality of resource flow (Larson, 1992) and innovation (Uzzi, 1997) and, in turn, company performance (Hoang and Antoncic, 2003). Researchers (Dew and Read, 2007 and Gilsing and Duysters, 2008) suggested that interacting on a frequent basis, interacting over a longer period of time, interacting in a relatively open style,

social norms, first tentativeness, shared concepts and technical norms are useful in governing the cognitive distance among the actors.

(4) While considering the relational, structural and governance properties of networks, it is not wise to ignore the growth of the networks. It is not reasonable to compare two firms that are at different stages of growth and development. It is also not reasonable to give unique suggestions to firms that are positioned at different stages.

Based on the analysis above, networks can be generalized into amount of time, reciprocal services, intimacy, emotional intensity, number of partners, diverse partners, partner selection and attitude to manage network (proactive and contingent) to further elaborate the structural, relational, governance and dynamic aspects of networks. These variables carry a general meaning when developing an understanding of the strength of ties, and the corresponding practices in the context of construction are described in Section 4.8.

3.6 Conceptual framework and research hypothesis

After the analyses of Porter's generic strategies, Sun Tzu's Art of War and the network strategy, this research proposes an integrated framework by combining all three of them. There is a need to provide the rationale for using both Porter and Sun Tzu's strategies since there are some differences between them, which may be attributed to the differences between Western and Chinese strategic management thinking;

between basic knowledge from the business and the military arena; and between modern times and ancient times.

Although the principles from Sun Tzu's Art of War and Porter's generic strategies are established in different ages and areas, the common aim of a "win" makes them comparable with each other. Established in a business context of high competition and a stable market structure, Porter proposed to obtain a "win" by occupying a superior market position compared to the competitors. In Porter's view, the approach to sustain a firm's market position is via three generic competitive strategies to maintain competitive advantages in cost leadership, differentiation and focus. Further analysis of the activities in the value chain is suggested by Porter to identify operational activities to conduct those strategies. Porter's frameworks are based on the belief that a win can be secured through planning. However, no matter how much deliberate planning a firm does, the issues that could happen in the dynamic and real environment can never be fully considered. Moreover, the elements in a strange environment that lead to the changes may be out of the scope of previous considerations.

Sun Tzu's Art of War came into being in the midst of chaos caused by wars. The environmental context determines that strategies should focus on predicting, responding, adapting and controlling under unpredictable situations. Deliberate planning is necessary. However, reactions to changes and emergencies are equally

important.

Although there are differences between Porter's and Sun Tzu's strategies, they are consistent in some aspects. Every strategy has to be shaped according to the specific environment a firm encounters. A general guideline is that for strategic planning, Porter's analytical framework is useful, while certain of Sun Tzu's principles should be considered in the implementation of these strategies in a new environment. From this perspective, it is possible to set up a framework using the principles and knowledge from both of them, for example, Mintzberg's framework to analyze the definition of strategy (See Section 2.3.5.4) is often taken as a reference. The strength of Porter's generic strategies as an analytical framework in strategic planning when combined with Sun Tzu's principles to deal with the unexpected in a dynamic environment contributes helpful insights in understanding the business strategies that are being used in the Chinese construction market. In this way, the formal and intended strategies of foreign operators may be realized with some assistance from those that are cultivated in Chinese strategic culture.

The respective weaknesses can be offset by the counterpart's strengths. Sun Tzu's Art of War, a representative of Chinese strategic philosophy, is assumed to play a role in reducing the gap between foreign firms and Chinese traditions in strategic thinking. At the same time, Sun Tzu's three principles of swiftness, adaptability and market intelligence in conducting planned strategies are chosen to supplement Porter's three

generic strategies of cost leadership, differentiation and focus.

The rationale for including network strategy into the conceptual framework is that economic actions are also socially situated and cannot be explained by reference to individual motives alone. The network strategy or *guanxi* in Chinese traditional culture is consistent with the current strategic trend of moving from competition towards cooperation (Fellow, 1993).

In summary, the conceptual framework of this research is rooted in three streams of strategic principles – Porter's generic strategies, Sun Tzu's Art of War and the network strategy. Cost leadership, differentiation and focus are derived from Porter's generic strategies. Sun Tzu's Art of War provides swiftness, adaptability and market intelligence strategies to the conceptual framework. Finally, the network strategy is derived from Granovetter's (1985) network theory as embededness. Figure 3.2 shows the main constructs of the conceptual framework to fill the gaps identified in Chapter 2. These are operationalized in Chapter 4. After identifying the relevant strategies, the general hypothesis (section 1.5) is refined. The specific research hypothesis is set up below.

> A combination of cost leadership, differentiation, focus, swiftness, adaptability, market intelligence and network strategies can help foreign firms to achieve a higher level of competitiveness in China.

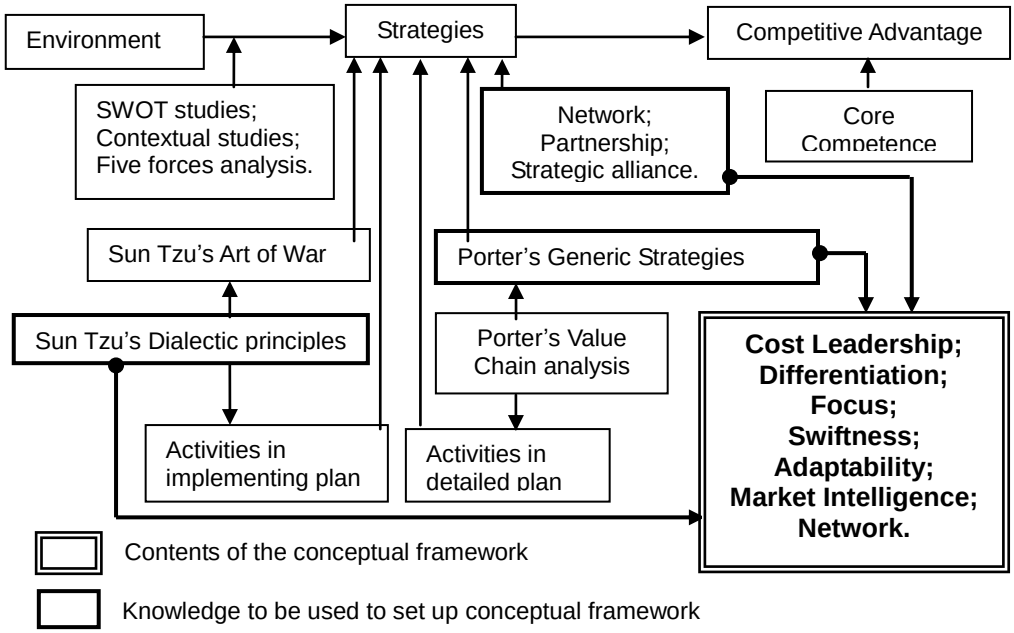


Figure 3.2 Contents of the conceptual framework

3.7 Summary

Porter's generic strategies, Sun Tzu's Art of War and Granovetter's network strategy are reviewed in this chapter. The basic principle, contents and applications of the original models as well as their strengths and weaknesses are discussed. The related strategies and principles, which are appropriate for setting up an integrated framework from diverse perspectives, are identified. From the review, a conceptual framework that combines the strategies derived from Porter's generic strategy in business, Sun Tzu's military strategy and the network strategy is proposed. It is suggested that the integrated framework will be much stronger than each of the strategy individually, since the strategies and principles complement each other. The practices to achieve the strategies are reviewed in the next chapter.

CHAPTER 4 OPERATIONALIZATION of VARIABLES

4.1 Introduction

The strategies to obtain competitive advantages have been discussed and identified by integrating Porter's generic strategy, Sun Tzu's Art of War and Network strategy (see Section 3.6). The conceptual framework identified seven main strategies to achieve competitiveness: cost leadership, differentiation, focus, swiftness, adaptation, market intelligence and network. In this chapter, the main strategies identified in the conceptual framework are operationalized based on previous studies found in related literature.

4.2 Cost leadership

Porter (2004) stated that having a cost leadership means a firm can earn a healthy margin by protecting itself from the five competitive forces, as compared to its less efficient rivals whose profits have been eroded away by the competition. Based on the analysis of the value chain, Porter identified the general activities to obtain cost advantage (see Table 3.1). Based on a review of research done on increasing cost efficiency in the construction industry, the practices to achieve cost leadership are discussed below.

Winch and Schneider (1993) recognized that some successful architectural practices

charge less than the average fees by repeatedly using the same design for some building elements, depending heavily on CAD, having low overheads as well as employing more technicians than architects.

The nature of the construction industry is such that it allows construction companies to introduce innovations (Laborde and Sanvido, 1994) and hence compete on the basis of product or process innnovation (Pries and Janszen 1995; Warszawski, 1996). Japan has the highest of R&D spending in the construction sector; construction firms spend about 3% of their gross receipts on technology development, (Raftery et al., 1998). Generally, the direct benefit of investing in technology is the increase in a firm's cost efficiency by reducing the number of workers.

Foreign firms operating in China may invest in technology in several ways. Investment in new equipment and machines to accommodate the local technological level is necessary to ensure that the benefits from a foreign firm's advanced technology can be applied in the host country. Investment in R&D is necessary to design new construction processes and methods, alternative corporate structures, new financing methods and so on (Arditi et al., 1997). Chiang et. al (2008) proposed that advanced technology allows a foreign firm to handle projects of a larger scale, thereby enabling it to take advantage of the economies of scale. Being better equipped with advanced information management systems, which include building design, business administration, project management and communications, means there is better and

more efficient information exchange within the organization, thus enhancing productivity (Shen et al., 2006).

Hambrick and Schester (1983) reported that administrative efficiency is one of the most important means of reducing cost. Construction companies have the option of exploiting this source of competitive advantage by emphasizing cost reduction and improving cost efficiency in their operations and activities across the departments. Kale and Arditi (2003) suggested that competition based on cost is determined by reducing costs in operations and administrative activities, and improving the cost efficiency of the contracting service offered.

Blayse and Manley (2004) stated that continuous learning undertaken by the staff, which increases firm-specific capability, and setting up a conducive organizational structure are important strategies for firms. This mirrors Ghemawat's (1985) finding that working on one project after another allows a firm to accumulate experience thereby enhancing the learning curve with further reduction in costs.

Warzawski (1996) proposed that construction firms can achieve a cost leadership strategy through the standardization of products, training of personnel, careful selection of suppliers, tight control, advanced technology and incentive programmes.

Khanna et al. (1998) suggested that vertical linkages offer possibilities for various subcontractors to work together through systematic coordination and proper

communication in long-term alliances. Enhancing the supply chain to deliver better construction services through a trust-building process is suggested by Chiang et al. (2008) to achieve competitiveness.

The suggestions by OCED (1992) to achieve cost efficiency include focusing on mass production and improving efficiency; utilizing prefabrication technology to improve quality, safety and efficiency; ensuring less design variations; maintaining long-term harmonious relationships with clients; giving due consideration at the design stage; improving managerial efficiency and investing heavily in R&D.

Cheah et al. (2007) combined industrial organization theories, and the resource-based and competence-based views in the study of strategies to improve the competitiveness of large construction firms in China. The strategies proposed by Cheah et al., (2007) in relation to cost control are reducing procurement costs of materials and equipment, manpower costs and administrative costs as well as controlling actual costs during construction and subcontracting costs.

Ling et al. (2008) studied the approaches to increase profit margin by analyzing the project management practices adopted by foreign firms in China. Results show that unchecked changes can lead to extra cost and they suggested that foreign firms monitor changes closely to ensure that the profit margin is not affected by additional costs that cannot be claimed.

The research also emphasized the training of staff. Although construction processes in China rely heavily on manual labour (Low and Jiang, 2003), the cheap but unskilled workforce may increase the need for work rectifications, which will have a negative effect on cost performance.

Based on the discussion above, which focuses on achieving cost efficiency, and the original practices proposed by Porter, cost leadership strategy is operationalized into be achieved by adopting the following practices:

-Firm learns continuously;

-Firm establishes vertical linkages;

-Firm invests in technology;

-Firm cuts suppliers' prices;

-Firm reconfigures (e.g. redesign, omit or refocus) its value chain;

-Firm reduces costs in its operations;

-Firm reduces costs in administrative activities;

-Firm avoids making changes to the process;

-Firm's staff undergo training regularly; and

-Firm offers a low price for its products/services.

4.3 Differentiation

Porter's competitive strategy of differentiation renders a company's product more

attractive by making it different and more valuable than the product of a competitor. Allen and Helms (2006) stated that differentiation is all about creating an edge that sets one contractor apart on the notion of “uniqueness” in order to appeal to clients.

Cnnon and Hillebrandt (1990) proposed four means of product differentiation in construction: offering a range of project management methods, extending from construction into design, extending into financial packaging, and extending forward into commissioning and facilities management. The operations of the Japanese contractors show there is much scope for firms to deepen their product differentiation under each of these categories, and that viable options may be limited only by one’s imagination (Betts and Ofori, 1992). Veshosky (1994) suggested that A/E firms can add value to the project by value engineering, constructability reviews, project management, assisting with financing and allowing differentiation between themselves and their competitors to create more opportunities. Studies show that firms can extend the scope of their services to clients. Driven by the desire to offer comprehensive services to clients, firms may identify and exploit more dimensions in differentiation. This is supported by Ling et al.’s (2005) findings that foreign firms can differentiate themselves by providing packaged or integrated services (for example, one-stop consultancy services covering the entire value chain), offering special products/services of superior quality, offering new ideas and management superiority.

Yates (1994) proposed permanent project teams which can sell the “team” concept

to new customers. This would satisfy clients who want single-point responsibility for the coordination of their projects. Firms can integrate the diverse structure of the industry and provide greater assistance to clients in the development and execution of projects. Independent firms can combine to form consortia, partnerships and strategic alliances. Greater integration will allow companies greater opportunity to work with major conglomerates.

Besides general contracting activities, the products/services involved in creating a product that gives maximum value to a client are engineering, project financing and project management activities (Mahmoud-Jouini, 2000; Whitla et al., 2006). Pries and Janszen (1995) stated that differentiation can be achieved by product innovation and process innovation. By fostering innovation and creativity as well as building a reputation of being technologically advanced, a firm is assured of meeting the interests of new clients as well as catering to the demands of existing clients for uniqueness (Allen and Helms, 2006). Porter also emphasized the linkages within the value chain's contribution to differentiation. Because international construction projects are usually complex, a business strategy will generally involve building up a network of contractors and partners (e.g. subcontractors, trade specialists, financial and legal advisers) in the host country (Strassmann, 1989).

The quality of products/services can be evaluated using a number of dimensions – performance, features, durability, serviceability, aesthetics, conformance to

specifications and perceived quality, depending on whether the offerings consist of products or services (Garwin, 1987). Kale and Arditi (2002) proposed that construction firms can achieve differentiation by providing products/services of high quality. The suggestions include achieving high quality in the constructed facility, achieving high quality beyond the specified requirements, being highly responsive to a client's requirements, improving communications to manage the interfaces, accommodating the owners'/clients' acceleration requests, differentiation through innovation and finding alternate corporate structures.

Ling et al., (2005a, b) also proposed some suggestions to achieve differentiation through high quality and specialized services in the Chinese construction market. In particular, foreign firms are required to be strong in offering sound management, engage high calibre professionals (self-motivated and self-sufficient staff), strengthen their technical expertise, increase their financial strength, be informed and knowledgeable about China, be sensitive to cultural and taste differences, and maintain good track records.

Cheah et al. (2007) suggested differentiation through reputation. Their approaches include high quality projects, advanced technology, and project financing.

Based on the literature review on differentiation, in this research, the differentiation strategy is hypothesized to be achieved through the following practices:

-Firm offers products/services which have unique features;

-Firm includes superior design techniques or adopts superior technology or management in product/service delivery;

-Firm ensures the quality of inputs is high;

-Firm provides high quality outputs;

-Firm provides innovative products/services; and

-Firm offers comprehensive services to clients.

4.4 Focus

Porter's focus strategy is based on applying cost leadership or differentiation to a very narrow segment of the market. Warzawski (1996) suggested that to obtain a focus strategy, firms should focus on certain types of projects, certain geographical areas, or certain types of clients. Veshoshy (1994) stated that niches appear to be defined primarily in terms of geographic and project markets. Other niches might be defined in terms of functional specialties, project size, or clients.

Kale and Arditi (2002) suggested adopting a narrow product/service and market approach which will enable a construction company to concentrate its resources and efforts on refining its competencies in order to meet the specific needs of its clients. Focusing on a market segment also enables a company to gain exclusive experience of the conditions and trends within that market segment, which will in turn increase its responsiveness. Therefore, adopting a narrow approach to competition in the context

of the construction industry presents some potential for creating a competitive advantage, and hence superior performance.

Shen et al., (2004) used three levels to classify construction projects. First, there are local, provincial, national and international projects. Second, projects can be classified into building or civil depending on their different industrial sectors. Third, a project can be a construction work or a design work, depending on which specialized level the firms are operating.

Based on the literature review above, under focus strategy, the following practices are operationalized:

-Firm serves one or two specific geographic construction markets in China;

-Firm operates in a specific construction market segment;

-Firm serves only a specific group of clients; and

-Firm offers a focused range of products/services.

4.5 Swiftness

Based on the discussion in Section 3.2.4, Sun Tzu's swiftness strategy can be achieved through timing, synergy and speed.

Sun Tzu's strategy of "choosing the right time to enter the market and attack the competition as a prerequisite for swiftness" is quite similar to Kotler's (1997) viewpoint

that if a firm's strategy implementation is swifter than its competitor, pioneer status and innovation can result from it.

Second, the statement "when torrential water pushes boulders, it is because of its momentum" expresses Sun Tzu's proposition that synergy of diverse actions can overwhelm one's competitors leaving them no time to think, respond or develop an effective defence.

Sun Tzu stated that:

> *"When victory is long delayed, the ardour and morale of the army will be depressed. When the siege of a city is prolonged, the army will be exhausted. When the army engages in protracted campaigns, the resources of the state will be impoverished."*

The meaning of "swiftness" in this dimension is the same as the meaning of "speed", which is to complete a project within the shortest time.

A/E firms can achieve swiftness in the construction industry from two perspectives – being speedy in responding to market requirements and being speedy in completing a project. The practices to achieve swiftness may involve both marketing-related and project-related activities.

Hastak et al. (1993) proposed that to be fast, firms should consider being the first

mover and eliminate time and other resource wastage within the different operations or production process. Based on these suggestions, they identified the practices in a implementation framework that include conducting good preliminary studies, encouraging customer involvement in the early stage of the whole product delivery process, offering innovative products and processes through active collaboration, doing proactive marketing, and setting up productive relationships with customers and special groups of people.

Some researchers (Stalk, 1998; Stalk and Hout, 1990) argued that superior use of time is a potentially powerful competitive weapon that can enable an organization to cater to its target market in a timely and speedy manner. To maintain this timeliness and speed, the speed of execution in transforming inputs (resources) into output (products/services) is vital to ensure that the product is delivered on time. There is significant potential for improving the speed of execution in the delivery process, especially when clients/owners highly value swift performance (Kale and Arditi, 2002). However, A/E firms should be aware that to be faster, they need to strike a balance between time performance and client satisfaction performance. For example, foreign firms usually make changes to designs to better meet owners' requirements or correct design errors thereby increasing client satisfaction (Ling et. al., 2009), but at the same time these changes may lead to a delay in time performance (McKim et al., 2000). Therefore, firms should accommodate a client's incessant requests in a speedy manner (Kale and Arditi, 2002).

Sarshar and Isikdag (2004) stated that to be speedy in accommodating changing and changed requirements, firms should be good at integration, collaboration and process improvement. Therefore, detailed planning is essential. With time specifications highlighted before the delivery, strict control over the operation process contributes to the speedy completion of a project. On the other hand, considering the right time to deliver a product to the host market is also important for foreign firms, especially architecture firms with competitive capability in innovative design, compared to local architecture firms. Firms can benefit from the first-mover advantage by giving due consideration to the timing of product delivery into the market and to the target clients. However, this is subject to a firm's careful planning based on its understanding of local demands.

Based on certain literature (Wheelwright and Clark, 1992; and Stalk and Hout, 1990), Yong et al. identified the principles to achieve time-based competition, including cross-functional product teams, time-driven checkpoint process, continuous customer involvement, concurrent engineering, modular design and flexibility, that can have a positive effect not only on A/E/C firms but also benefit owners and developers in the construction industry.

Based on the literature review above, swiftness is hypothesized to be achieved in the following ways:

-Firm achieves fast delivery from supplies;

-Firm owns fast internal communication;

-Firm accommodates a client's incessant requests;

-Firm takes action to improve the speed of execution;

-Firm innovates its products/services continuously; and

-Firm collaborates actively.

4.6 Adaptability

Based on the discussion in Section 3.2.4, from Sun Tzu's perspective, adaptability can be achieved through "being flexible in shape" and "making choices according to the changes". Previous studies in non-military areas (see Section 3.2.4) show that these two dimensions are relevant to a firm's adaptability in terms of culture, structure, employee, communication and supply chain management.

Based on the UK construction industry, Lansley et al. (1979) found that flexible contractors who are able to adapt to the changing demands of the environment are those who: (i) have clearly defined and stated objectives that are supported by strong management commitment, (ii) consider employees' welfare, (iii) emphasize high levels of employees' morale and job satisfaction, (iv) promote effective corporate planning strategies, (v) have an effective market sensing mechanism, and (vi) make full use of employees' knowledge and potential in every aspect of decision making. A later study done by Lansley (1987) also suggested that a management style with a strong employee emphasis will contribute toward achieving flexibility. In addition, the author

also proposed that in pursuing organizational flexibility, an organic structure and a high level of problem-solving skills are necessary. Runeson and de Valence (2009) found that the training of employees has become an important strategy for construction firms to achieve in order to develop flexibility in a changing business environment.

In the area of problem-solving skills, Walker and Loosemore (2003) suggested that a systematic problem-solving approach, which encourages learning within the project environment, can enhance participants' flexibility potential and result in responsiveness to any unanticipated challenges during the project.

Ofori and Debrah (1998) proposed a "flexible firm" model for the Singapore construction industry. This is a model that uses functional and numerical flexibility to respond to the fluctuations in production demand. In their study, a core-peripheral flexibility model, which keeps a minimum number of core employees and changes the number of peripheral works, is found appropriate for product-related organizations. From their perspective, a flexible firm model should contribute to strategic flexibility.

Depending on the structure of a firm, there are diverse dimensions to explain the characteristics a firm should have so as to achieve flexibility. Burton and Obel (2004) described simple configuration, functional configuration, divisional configuration and matrix configuration. In the same research, comparisons between them were done. In general, simple configuration, with a flat hierarchy and one decision maker, possesses a moderate degree of flexibility. Functional configuration possesses a low level of

flexibility. Compared to simple configuration, the more vertical and horizontal specialization of functional configuration makes it more appropriate for achieving internal efficiency goals and less appropriate to respond to changes (Volberda, 1998) and unforeseen contingencies (Khandwalla, 1977). Divisional configuration improves adaptability to marketplace changes by minimizing the interdependence of subunits. Therefore, the subunits are relatively free in divisional configuration compared to those in functional configuration. Matrix configuration, which combines the essence of both functional and divisional configuration, is characterized by its structural arrangement with promotes effective communication and swift decision-making, and thus improves responsiveness to changes in the environment (Volberda, 1998; Krijnen, 1979).

Burns and Stalker (1961) classified structures into mechanistic and organic types according to the adaptive capability of the firm. The levels of control and centralization are the main attributes to identify these two types of structure. A high degree of information sharing and integration, as well as a low level of formality and centralization, are characteristics that promote an organic structure's adaptability (Minzberg, 1979; Volberda, 1998). A mechanistic structure is just the opposite.

Yates (1994) found that firms in the US construction industry move away from authoritative management styles towards variations of participative management and employee involvement. Organizational structures should reflect the flattening of structures, and firms should develop corporate cultures that will allow them to move

faster, communicate more clearly and become companies without boundaries. In this research, the operationalization of structures into these six configurations was not adopted since it is not feasible to ask the foreign firms to make a choice among these options. An expert in the pilot study had commented: "There are so many academic terms, and we have to spend so much time reading your explanation of them." Therefore, structures were operationalized according to hierarchy, powers of middle management and employee involvement in decision making.

Researchers also emphasized that seeking and exploring alternative options is the key to achieving good construction performance (Walker and Shen, 2002). Ford et al. (2002) realized that dynamic uncertainties cannot be addressed by planning for pre-project strategic selection, while strategic options are necessary to provide adequate useful alternative strategic design and valuable tools. They further explained that the flexible project strategies, which are in the form of options, are valuable in uncertain conditions and unpredictable situations (Ford and Bhargav, 2006). These ideas emphasizing the options in the pre-project stage by evaluating and planning mirror those of Gil et al. (2005) who suggested over-designing products to accommodate future needs as one of the important managerial strategies to achieve process flexibility. The above suggestions and findings support the viewpoints from earlier study (Gerwin, 1993) that flexibility should be proactive and dynamic because firms need to create, maintain and build new options to help them respond to marketplace changes.

Price and Chahal (2006) studied change management and discovered that the strategic framework to manage changes includes: preparing the organization for the change, developing the vision and implementation plan for the change, communication and workforce engagement to avoid resistance to change, sufficient commitment and support from the top management, and emphasizing middle management's role in change evaluation and execution.

Alas and Sun (2007) realized that culture is important in facing and living through changes that are taking place in the organization. They proposed the following strategies to facilitate change and overcome resistance to change: communication, employee participation, adaptability-based organizational culture, avoiding the use of coercion, considering the emotions and needs of employees, creating a compensation and incentive system to facilitate changes, enhancing employee commitment to the change and making a commitment to management development.

Based on the literature review, adaptability is hypothesized to be achieved in the following ways:

-Firm creates an adaptable organizational structure (flatter structure comprising fewer levels of hierarchy);

-Firm does innovative marketing for products in advance;

-Firm establishes organizational culture based on adaptability mechanism;

-Firm offers options when faced with changes during implementation;

-Firm encourages employee participation in decision making;

-Firm empowers middle management to evaluate and execute changes; and

-Firm has a post-change responsive system to pay compensation for losses arising from unexpected events.

4.7 Market Intelligence

According to Sun Tzu, foreknowledge is important (see Section 3.4.3), and this is obtained by a systematic collection information and possessing the capability to adopt, transfer and develop that information into intelligence.

The importance of intelligence is also realized by researchers focusing on information management. Bharadwaj (2000) stated that to achieve good information management, firms should consider the IT infrastructure (computer and communication technology and the shareable technical platforms and databases, human IT resources, technical IT skills and managerial skills and other IT-enabled intangibles), customer orientation, knowledge assets and synergy. MOC (2005) urged local Chinese firms to improve their information management capability by equipping themselves with advanced information technology and management skills to increase their intelligence through stored and transferred knowledge. Shen et al. (2004) discovered that in the Chinese construction market, useful information can only be obtained when there is a system to deal with market information coupled with the ability to process and manage the information.

Besides the tangible and intangible assets of IT, the source of information should also be considered. Combs and Moorhead (1992) emphasized competitive intelligence in operating business and corporate strategies. They defined competitive intelligence as the selection, collection, interpretation and distribution of publicly-held information that has strategic importance.

Ling et al. (2005) found that knowing the host country market is an important strategy for foreign firms in China. Foreign firms need to make a comprehensive risk assessment first before entering the market. They emphasized that appointing a local agent to manage bureaucratic hassles is important, since local agents are more familiar with the local culture and environment. The approval process in China is different from that of the foreign firm's home country. Creating a special development team to deal with relationship building and government approvals is a good way to address this issue. Teaming up with Chinese firms which are knowledgeable and have the right connections and *guanxi* in the local construction market will help foreign firms to avoid wastage of time and cost in seeking projects and market opportunities.

To obtain as much information as possible of the host country, foreign firms need to know where and how to access both public information and tactical information. Since most of the information needed for a given project is available through publicly available channels (Combs and Moorhead, 1992), foreign firms need to extend their antennas to regulatory agencies and trade associations to access financial documents,

industry information and the list of companies in a particular industry. However, it should be known that public data on the Chinese construction market is limited in accuracy and comprehensibility (Fang et al., 2004). This makes it necessary for foreign firms to develop their own informal channels to obtain tactical information on one hand, and strengthen their capability in interpreting and transferring information on the other hand.

Based on the literature, market intelligence is hypothesized to be achieved in the following ways:

-Firm obtain information from local agents;

-Firm appoints dedicated staff/team to deal with government approvals;

-Firm assesses risks comprehensively before embarking on a project in China;

-Firm equips itself with good information and communication infrastructure;

-Firm equips itself with good information analysis infrastructure; and

-Firm accesses broad market information.

4.8 Network

Granovetter's (1985) postulated that economic transactions also include social obligations, kinship obligations, knowledge of the identity of transactions, and past relationships between transactors. The construction industry's heavy reliance on people at each stage of its procurement, and the various complex links among

participants such as contractors, subcontractors, customers, clients, governments, suppliers and consultants, make networking an important competitive strategy.

Katsanis et al. (1997) proposed that the building industry is an archetypical dynamic network organization because there is a high degree of outsourcing and partnering. Heterarchy is the dominant configuration instead of hierarchy, and assets are fully distributed among various firms instead of being held by a single firm. In China, the concept of networks is known as *guanxi*, which is looked upon as the important competitive capability (Cheah et al., 2007). In construction, numerous management terms are used to describe the relationships between firms, for example, partnering, integration, partnership, network, strategic alliance, strategic partnership, vertical integration and cooperative partnership (Cheng et al., 2000).

As dissussed in Section 3.5.2, networks can be generalized into amount of time, reciprocal services, intimacy, emotional intensity, number of partners, diverse partners and attitude in managing networks (proactive vs. calculative) to elaborate on the structural, relational, governance and dynamic aspects of networks. The practices in construction to operationalize these variables of networks are discussed below.

In construction, reciprocal services involve the giving and receiving of products/services. Firms provide resources and capabilities that serve as inputs to complement other firms. Firms may provide mutually supportive product/services to other firms in the network (Devilbiss and Leonard, 2000; Cheng et al., 2000).

Devilbiss and Leonard (2000) suggested that to ensure successful partnering, firms need to: be dependable to build trusting relationships; be responsive in understanding and meeting a partner's needs; and have faith to come together and seek mutually supportive actions. They also stated that in the implementation of a partnership, the committed and active participation of leaders, partner culture, energetic involvement of an empowered and educated workforce, and effective communication are important elements.

Cheng et al. (2000) identified the critical factors for construction partnering as: obtaining adequate resources, obtaining support from top management, establishing mutual trust, keeping long-term commitment, coordinating among the partnering parties, keeping partnering creative, communicating effectively among partnering parties, resolving conflicts effectively, satisfying partners' expectation, and setting up compatible goals.

Strassmann (1989) stated that international construction projects are usually complex, and the common business strategy will involve building up a network of contacts (e.g. subcontractors, trade specialists, financial and legal advisers) in the host country. Obtaining political backing for the project is also vital (Titus, 2000). Yates (1994) proposed multifaceted partnering. In his opinion, smaller companies can focus on servicing larger companies, and he suggested that foreign firms set up partnerships with other foreign firms.

To ensure a successful supply chain integration, Briscoe et al. (2004) recommended that firms have good communication channels that will facilitate the smooth flow of information along the chain. Their study also emphasized that individuals who are responsible for the relationships are important to the integration of the supply chain as these people usually retain diverse knowledge from different organizations.

Ling et al. (2005, 2006, and 2008) identified networking as an effective business strategy for foreign AEC firms operating in China, and that building networks and contacts in China is important to ensure the success of their projects. Ling et al. (2005) stressed the importance of personal relationships, trust, reciprocity and permanence in managing networks. These studies also emphasized the importance of support from the head office when foreign firms operate outside their home countries. They also suggested that networking may be strengthened if the foreign firm becomes a member of a Chinese consortium, partnering local firms which are knowledgeable and have the right connections. The face-to-face interviews conducted in Ling et al.'s (2005) study concluded that shared information among the network between foreign firms and Chinese firms helps to avoid repeated activities in learning and inventing. To ensure that networking brings optimum results, Ling et al.'s (2005) study emphasized the importance of networking with the right people.

The governance of a social network depends on the implicit and open-ended contracts (Jones et al., 1997). Control of the network is by power (Brass, 1984), threats of

ostracism (Portes and Sensenbrenner, 1993) and the loss of reputation rather than by legal enforcement (Larson, 1992). To operate in the Chinese construction market, finding the right person and firm as partners is the most critical factor for success (Ling et al., 2005). This is the first step to control the direction of the networking process. Firms may select a partner by analyzing the diverse attributes of a firm from different perspectives. Some of the attributes may overlap with the practices discussed above, for example, the duration of network and the resources, knowledge and technical level of the firm. Another two practices are adopted to operationalize the governance variable, i.e. the compatible goals between players and information communication between players.

Based on the literature review as well as the variables identified in section 3.5.2, the network strategy is operationalized into the following practices:

-Firm establishes mutual trust among other firms in its network;

-Firm has long-term commitment with other firms in the network;

-Firm resolves conflicts effectively;

-Firm seeks mutually supportive actions with other firms in its network;

-Firm engages in multilevel partnering (e.g. architect, general contractor, sub-contractor, etc);

-Firm achieves political backing from the Chinese government;

-Firm achieve political backing from the home country's government;

-Firm is a member of a consortium in China;

-Firm partners with local PRC firms;

-Firm collaborates with its competitors to add value to its products/services;

-Firm encourages information communication among networks;

-Firm obtains resources from other firms;

-Firm establishes routes to share knowledge with other firms;

-Firm sets up network proactively;

-Firm sets up network contingently;

-Firm sets up compatible goals with partners;

-Firm enlarges the number of partners.

4.9 Measurement of performance

Porter (1985) stated that the aim of a competitive strategy is to establish a profitable and sustainable position against the forces that determine industry competition. Profitability is chosen because it is widely recognized as one of the most important indicators of financial performance (Kaplan and Norton, 1996). However, construction is complex because various participants are involved. Sharma et al., (2001) stated that a firm needs to integrate its value chain with those of its suppliers, and customers particularly in the business-to-business markets that are becoming more fragmented and increasingly impacted by globalization and developments in Internet communication and technology. As firms are embedded gradually into the value network (Porter,1985), competitiveness should be measured from a broader extent.

Konchar and Sanvido (1998) measured success in terms of unit cost, construction speed, delivery speed, cost growth, schedule growth and several quality measurements. In Chan et al. (2004) framework, they added additional dimensions of user expectation, participant's satisfaction, environmental performance, health and safety, and commercial value. Ling et al. (2004) added owner's satisfaction and owner's administrative burden. In a study predicting project performance in China, Ling et al. (2008) used cost performance, time performance, quality performance, owner satisfaction and profit margin as the measurements to ascertain project success.

In this research, the number and value of projects are also considered when determining a firm's performance relative to its market share. In addition, public image is added as one of the seven measurements. Foreign firms operating in the Chinese construction market should not only try to satisfy the requirements of their target customers, but, on a broader scope, that of potential clients or customers as well. This is also consistent with Sun Tzu's idea that harmonious unity and the harmonious relationship between the army and the surrounding environment will lead to victory.

Based on the above discussion, the objective functions of study are as follows:

- Firm is competitive in winning large number of projects (P1)
- Firm is competitive in winning high-value projects (P2)
- Firm is profitable (P3)
- Firm's product/service quality is competitive (P4)

- Firm is competitive in achieving client satisfaction (P5)
- Firm is competitive in achieving good public image (P6)
- Firm is competitive in fast product/service delivery (P7).

Based on the literatures in this chapter, the seven strategies consisting conceptual framework (See section 3.6 and figure 3.1) is operationalized into 56 practices. The competitive performance is operationalzied into seven practices. The structure of the conceptual framework is shown in Figure 4.1. This framework is labeled as PSN framework because it is underpinned by **P**orter's generic strategy, **S**un Tzu's military strategy and **N**etwork strategy.

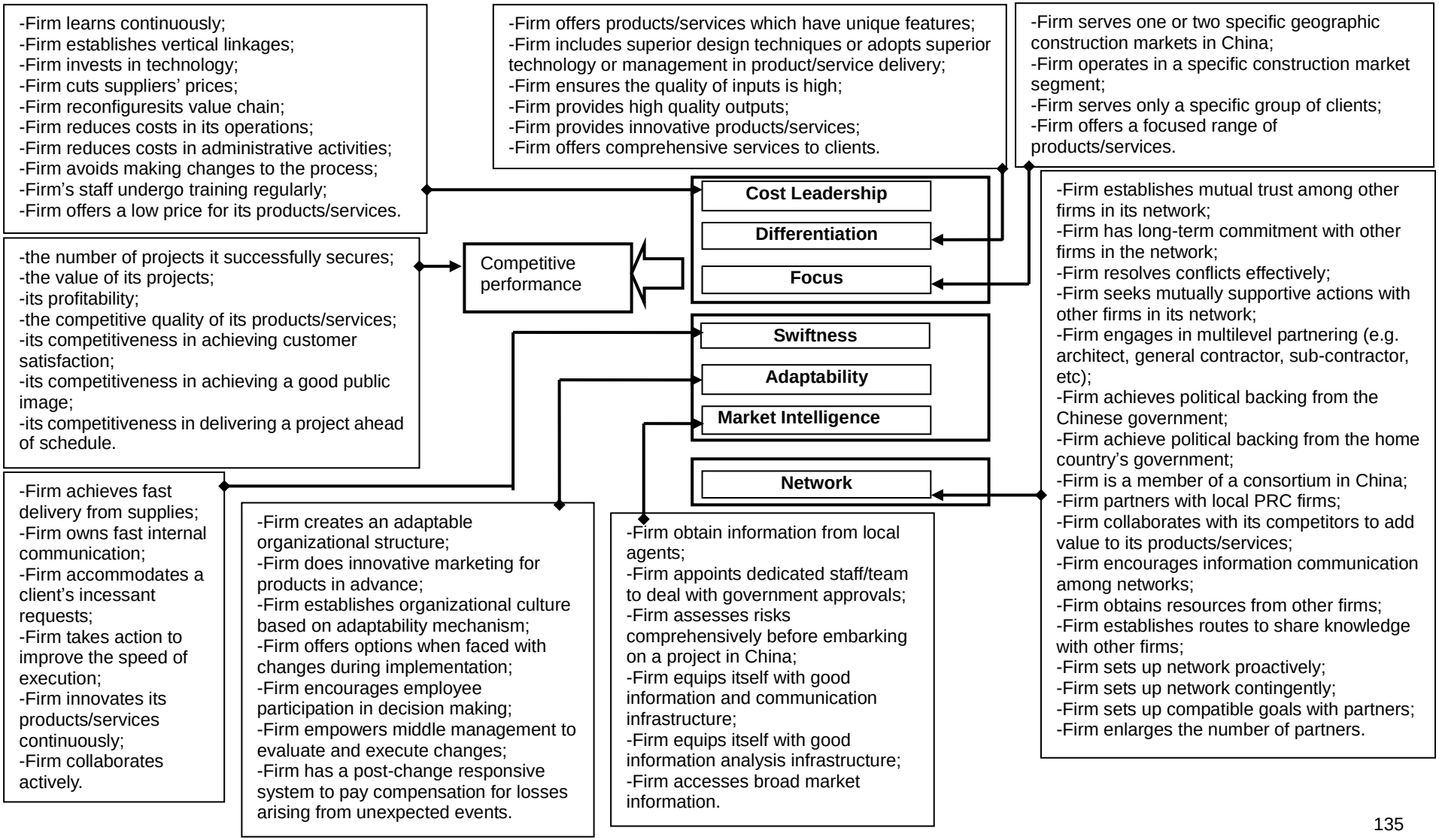


Figure 4.1 Conceptual **PSN** framework for foreign firms to achieve competitive performance in China

4.10 Summary

In this chapter, practices and activities to achieve the strategies in the conceptual framework are operationalized.

Based on Porter's generic strategies, practices relevant to the construction industry were reviewed. Under cost leadership, differentiation and focus strategies, ten, six and four practices were operationalized. With regard to the strategies adopted from Sun Tzu's Art of War, practices relevant to swiftness, adaptability and intelligence relevant to the business environment were reviewed. From these, six, seven and six practices for swiftness, adaptability and market intelligence relevant to construction industry were operationalized. In addition, 16 practices to achieve network strategy were also operationalized.

Seven measurements of performance of foreign firms in the Chinese construction market were also operationalized in this chapter.

The operationalized practices and measurements of performance used to set up the questionnaire for the survey.

CHAPTER 5 RESEARCH DESIGN AND METHOD

5.1 Introduction

This chapter presents the research approach and the data collection techniques and methods used to analyze the data. Considering the objectives of this research, a quantitative approach was adopted and a survey research design chosen as it is more appropriate for this study than any other. A questionnaire was used in the survey as an instrument to collect data. The chapter also describes the data analysis which involves t-test and structural equation modelling technique. The whole research was conducted in four phases: exploration, description, explanation and validation (see Figure 1.5).

5.2 Research approach

Rubin and Babbie (2006) stated that the quantitative and qualitative methods are factors that influence the specific ways that researchers or practitioners implement the research process. Creswell (1994) termed the quantitative approach as a traditional, positivist, experimental or empiricist paradigm, and the qualitative approach as a constructivist, naturalistic, interpretative, postpositivist or postmodern paradigm. The assumptions of both the quantitative and qualitative approaches as summarized by Creswell (1994) are shown in Table 5.1.

Table 5.1 Assumptions of quantitative and qualitative approaches

Assumption	Question	Quantitative	Qualitative
View of reality	What is the nature of reality?	Reality is objective and singular, apart from the researcher.	Reality is subjective and multiple as seen by participants in a study.
Role of the researcher	What is the relationship of the researcher to that being researched?	Researcher is independent of that being researched.	Researcher interacts with that being researched.
Purpose of the research	What is the intention of the research?	To discover existing laws and structures.	To explore and explain different “realities”.
Methodology of the approach	What is the process of research?	Deductive processes Cause and effect Static design – categories isolated before study Context-free Generalizations leading to prediction, explanation and understanding Accurate and reliable through validity and reliability	Inductive process Mutual simultaneous shaping of factors Emerging design – categories identified during research process Context bound Patterns, theories developed for understanding Accurate and reliable through verification

Adapted from: Creswell (1994); Alston and Bowles (1998)

Henn et al. (2005) stated that there are two divergent views about the nature of knowledge, which can be grouped as positivist paradigm (associated with quantitative research strategies) and interpretive paradigm (associated with qualitative research strategies). See Table 5.2. Both positivism and interpretivism have their place in research. In the positivism approach, the inductive approach is first taken where phenomena are observed and then theories developed from the observations. Positivism will develop a theory based on the observations of similar phenomena. The theory will eventually become a law that is applied to all similar phenomena. Unlike positivism, the interpretive approach assumes that human behaviour is not determined by external factors and processes that researchers can measure, but instead is shaped by the meanings people have of the world. Thus, qualitative methods are usually criticized as being “too subjective and even pseudo-scientific” (Yin 1984).

Likewise, "investigators who do case studies are often regarded as having deviated from their academic disciplines, and their investigations as having insufficient precision (that is, quantification), objectivity and rigor" (Yin 1984). The approach relies on personal interpretation of data and inferences. Results from case studies may not be easily generalizable, are difficult to test for validity, and rarely offer a problem-solving prescription. Simply put, relying on one or a few subjects as a basis for cognitive extrapolations runs the risk of inferring too much from what might be circumstantial (Yin, 1994).

Table 5.2 Positivist and interpretivist approaches

Positivism	Interpretivism
1. Knowledge is based on phenomena that are directly observable (phenomenalism).	1. Knowledge is based on understanding interpretations and meanings that are not directly observable.
2. The social world should be researched using the principles of natural science. Such a shared approach is often referred to as the unity of scientific methods.	2. The social world should be studied in its natural state to understand naturally occurring behaviour.
3. There is a stress on reliability and generalization.	3. There is a stress on validity.
4. Explanation is achieved through the formulation of causal laws or law-like generalizations.	4. Explanation is achieved through descriptions of social meanings/reasons and other dispositions to action.
5. There is use of the hypothetic-deductive method in which there is an emphasis on testing a given theory.	5. There is use of the analytic-inductive method in which a theory is generated from the data.
6. Methods imply researcher/respondent detachment in the objective collection of data.	6. Methods imply insider approach-participation in life and culture of respondent/closeness of respondent and researcher in the joint construction of subjective data.
7. Analysis is based on the statistical testing of given theories.	7. Analysis is based on verbal, action, and situation description from which a theory evolves.

Source: Henn et al. (2005)

The main aim of this study is to set up a model for a group of subjects (foreign firms) to achieve a specific goal (competitive performance) in a specific environment (the Chinese construction market). To achieve this objective, some requirements need to

be satisfied. First, there are the factors (general strategies and practices adopted by foreign firms) that can be induced from the phenomena (behaviour of foreign firms operating in the Chinese construction market) and the special factors (critical strategies and important practices) that determine the achievement of the specific goal (competitive performance in the Chinese construction market). Second, these special factors are applicable to a group of subjects (general foreign firms) rather than a special unit (an engineering firm operating in Beijing). Third, the factors induced can be applied to other foreign firms operating in China but were not involved in the survey as well as those that will be entering the Chinese construction market. Based on the analysis of the objective of this study as well as the comparison between positivism and interpretivisim in Table 5.2, the quantitative research approach was adopted. Quantitative approach was conducted to achieve generalized strategies for foreign firms operating in China, by discovering strategies surveyed firms adopted.

5.3 Research design

Creswell (1994) suggested the survey design and experiment design be used for the quantitative approach. A survey design provides a quantitative or numeric description of some fraction of the population – the sample – through the data collection process of asking questions of people (Fowler, 1988). A researcher will generalize the findings from a sample of responses to a population. An experiment test identifies the

cause-and-effect relationships in which subjects are assigned to groups randomly. One or more independent variables are manipulated and researchers will determine whether these manipulations cause an outcome (McMillan & Schumacher, 1989). The cause and outcome can be tested because, theoretically, all variables between the manipulated variable and the outcome are controlled in the experiment.

In this research, a survey design was preferred rather than the experiment test as a data collection procedure because of its advantages in terms of economy of design, rapid turnaround in data collection and the ability to identify attributes of a population from a small group of individuals (Fowler, 1988; Babbie, 1990; Tan, 2002b). At the same time, the objective of this research makes it inappropriate to adopt the experiment design since the research focus is not on the manipulation of variables to measure their effects through an experimental setting, but rather on the relationships among variables. Moreover, subject matter experts who inform that research would not agree to experimental setting because it is time consuming.

5.4 Exploration phase

The first phase of the research is the exploration phase, to gain with the research topic (Rubin and Babbie, 2006). It is important to uncover the major issues for the subsequent description phase. The issues are identified based on the knowledge gaps

in previous studies involving both academic knowledge and practical experiences in relevant areas (see section 2.6). The aims of this phase are to: (i) identify the components to set up a framework to address strategic competitive issues, (ii) identify the common practices and activities to achieve competitive strategies, (iii) design the data collection instrument for the description phase, and (iv) pilot test the tentative questionnaire to determine its clarity and ability to test the conceptual framework.

5.4.1 Literature review

The knowledge in this phase is obtained through literature review, which allows researchers to discover any existing knowledge on the issues that is already available, to determine how the study will differ from existing works and hence add to the knowledge in the area, and to conceptually frame the work (Alston and Bowles, 1998; Scandura and Williams, 2000).

The sources of the literature review for this research are mainly from books, academic journal papers, formal documents and archives (See chapter 2). The contents of the literature review involved four aspects – foundational theories, contextual information, relative practical frameworks and practical experiences. Tan (2004) proposed that a good review addresses the theory's assumptions, key concepts, logical links, strengths and weaknesses. Based on this principle, the conceptual framework was established

to address the gap in knowledge (see Figure 4.1).

5.4.2 Data collection instrument

Based on the literature review, a data collection instrument in the form of a survey questionnaire was designed. A questionnaire is appended in Appendix 1 and it comprises four parts.

Part 1: General information of respondent's firm

This part required respondents to provide information on:

- The nature of HQ's business;
- Location of HQ;
- Size of workforce in China;
- Estimated total annual revenue in China;
- Profit margin in China;
- The year that firm entered China;
- Main location of projects in China;
- Type of facilities that firm operates in China; and
- Type of services that firm provides in China.

Part 2: Competitiveness of respondent's firm

In this section, the respondents were asked to evaluate their competitiveness compared to their main competitors. The competitiveness is defined in seven dimensions:

- Firm is competitive in winning large number of projects;
- Firm is competitive in winning high-value projects;
- Firm is profitable;

- Firm's product/service quality is competitive;
- Firm is competitive in achieving client satisfaction;
- Firm is competitive in achieving good public image; and
- Firm is competitive in fast product/service delivery.

A 7-point Likert scale was proposed, where 1 represents "my major competitor is far superior to my firm", 4 represents "my firm has the same competitiveness as my major competitor", and 7 stands for "my firm is far superior to my major competitor".

Part 3: Practices adopted by respondent's firm

In this section, a list of practices was provided. Respondents were required to rate the extent to which the practices are effective in helping them as foreign firms increase their competitiveness in China. The rating was based on a 7-point Likert scale, where 1 represents "my firm does not practise this", 4 represents "my firm practises this to a moderate extent", and 7 stands for "my firm practises this to a great extent".

Part 4: Other strategies

Respondents were asked to indicate any other activities that need to be considered which help foreign firms to increase their competitiveness when operating in China.

5.4.3 Pilot study

Before conducting the industry wide survey, a pilot study was undertaken. The aims of

the pilot study are to clarify research question boundaries and make the research more focused (Walker, 1997a), ensure that the questionnaire is coherent and comprehensible, and ensure that the responses are accurate.

In this study, three subject matter experts were chosen to conduct the pilot study. The reason for choosing three experts is inspired by Atkinson's (1984) triangulation concept. The triangulation concept states that information about a single phenomenon should be collected from at least three different sources, or at least information should be obtained from three different techniques, because the validity of the information will be doubted and reduced when it comes from only one expert. The experts were randomly selected from senior personnel working in firms that are not headquartered in China but have undertaken projects in China. They were requested to highlight questions which are not relevant to the real situation for foreign firms that are operating in China.

In general, all the experts expressed that the questionnaire was comprehensive. However, they were concerned whether the questions could be completed in 20 minutes since the questionnaire was rather long. They also stated that some questions might not achieve the desired results because the answers to these questions may be looked on as the private information of the firms. Two experts suggested that the questions be placed in a random sequence rather than arranged under each strategy.

Based on these suggestions, the questionnaire was adjusted in three aspects. First, to encourage foreign firms to participate in the study, foreign firms were allowed to skip sensitive questions (relevant to financial data). Second, foreign firm's anonymity was guaranteed. Third, the sequence of questions was randomly presented in the questionnaire. The adjustment and modification of the questionnaire following a pilot study can make the data collected more accurate.

5.5 Description phase

After predicting what might be, researchers seek a second purpose – to describe situations and events. Rubin and Babbie (2006) stated that in quantitative studies, the description phase typically refers to the characteristics of a population and is based on data obtained from a sample of people that is thought to be representative of that population. In this study, the aim of this phase is to determine the important activity-based factors to achieve competitive strategies of the population. To fulfill the task in this phase, it is necessary to choose an appropriate data collection method and an effective sampling technique.

5.5.1 Data collection method

According to Robson (2002) and Jackson (2006), there are three ways to administer a

survey: (i) mail survey, (ii) telephone survey, and (iii) personal survey. Table 5.3 shows the comparison of these three techniques.

Table 5.3 Comparison of three survey instruments

Description	Mail survey	Telephone survey	Personal survey
Cost	Lowest	Middle	Highest
Response rate	Lowest	Moderate	Highest
Coverage	Reaches greatest number of people yet only those with good literacy skills and motivation respond.	Reaches respondents with poor literacy skills but only those who have telephones.	Reaches smaller numbers but wide range of people, whether illiterate, of low income or without a phone.
Convenience	Respondent can complete in own time, at own pace. Quick results ready for computer entry.	Can be completed quickly. Direct computer entry of results.	Time-consuming for interviewer and respondent. More time-consuming to code and enter data.
Accuracy and type of information	Visual layout can help comprehensiveness; cannot clarify confusion, probe or prompt.	Can clarify questions; limited opportunity to probe and prompt.	Can clarify questions, probe and prompt; can record nonverbal and other responses.
	Cannot check if right person answered the questions.	Cannot always ensure the right person answers the questions.	Can ensure the right respondent answers questions in the right order.
	Cannot check if questions are answered in the right order.	Ensure questions are answered in the right order.	Interviewer may misrecord response.
	Partial response possible.	Miss nonverbal responses.	Most likely that survey will be completed.
	Need to be short to ensure response rate.	Greater chance that survey is completed fully.	Allows for longer, more open-ended responses.
	Least chance of bias caused by interviewer's attitudes and presence.	Must use simple questions; moderate chance of interviewer bias.	Highest chances of interviewer bias.
	Can obtain some sensitive and private information.	Can obtain a moderate degree of private information.	Can obtain less sensitive and private information.
Anonymity	Highest level of anonymity/ confidentiality.	Less assurance of anonymity.	Less assurance of anonymity.

Adopted from: Alston and Bowles (1998); Jackson (2006)

The above comparison shows that each data collection method has its own advantages and disadvantages. Alston and Bowles (1998) suggested that the decision on the choice of instrument will rest upon the objectives of the project, the resources at the researcher's disposal, the sample of people the researcher aims to research and

the type of information the researcher is seeking.

The duration, cost and response rate of the survey and the validity of the data collected were very important considerations for this research. Thus, a two-pronged data collection method was adopted. The first was a self-administrated mail questionnaire survey. To offset the disadvantages of the mail questionnaire survey, some actions suggested by Bernard (2000) and Jackson (2006) were taken to improve the response rate. A cover letter to explain the purpose of the research was enclosed. To lessen resistance to the survey and motivate people to respond, respondents could request for a summary of the findings. In addition, the questionnaire was sent out twice and pre-paid postage return envelopes were included in the survey package.

The second prong of data collection was the personal survey. Considering the possibility of a low response rate to the mail survey, a request for a personal survey was also made to the firms that were identified for the mail survey. A personal survey has several advantages over a mail survey (see Table 5.2). Some suggestions proposed by researchers (Rubin and Babbie, 2006) were adopted to ensure that the personal survey was conducted smoothly. First, interviewers must be familiar with the questionnaire to avoid placing any unnecessary burden on the respondents. Second, interviewers can gather additional information from the respondents' replies to certain questions by understanding their gestures and tones. Third, interviewers should try to

probe for a response, especially when the respondents answer inappropriately.

5.5.2 Sampling methods

Alston and Bowles (1998) stated that sampling can be categorized as either probability or non-probability sampling. In probability sampling, each unit of the population has an equal or known chance of being selected for study. Generally, there are four main types of probability sampling – simple random sampling, systematic random sampling, stratified random sampling and cluster random sampling. On the other hand, since non-probability sampling is not representative of the population under study, the generalization of results is limited. There are also four common types of non-probability sampling – accidental (sometimes called convenience or availability) sampling, quota sampling, purposive sampling and snowball sampling. The characteristics and description of these sampling types are shown in Figure 5.1.

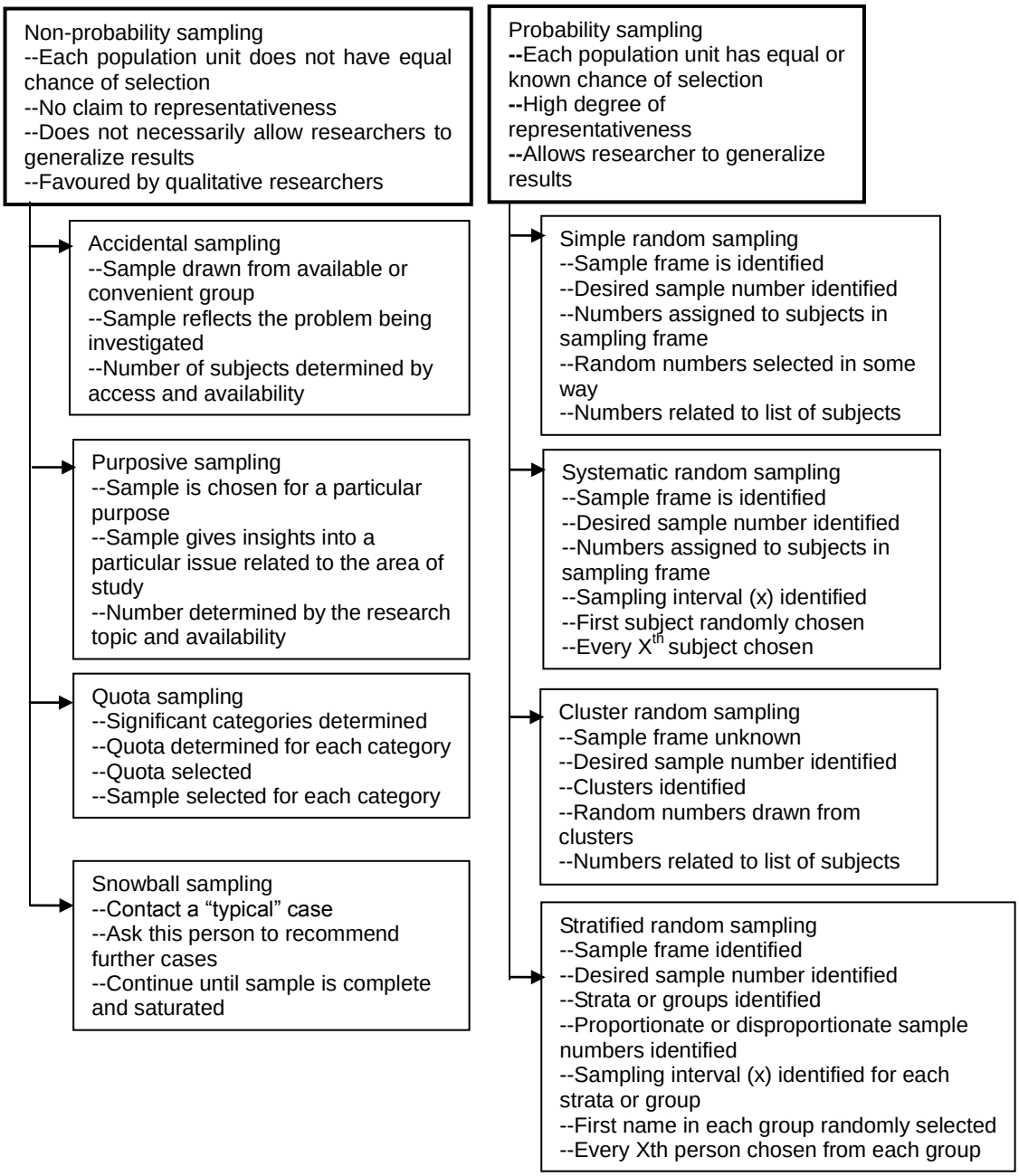


Figure 5.1 Types of sampling used in social research

Adapted from: Alston and Bawles (1998)

In this study, the population comprised all construction related consultancy firms (hereinafter referred to them as foreign firms) (the definition of the foreign firms see section1.5) that are not headquartered in China, but have undertaken construction projects in China. However, there is no authoritative list of all foreign firms operating in

China. The sampling frame for this study is foreign firms operating in Beijing and Shanghai. These two cities are chosen as the place to conduct the survey because: (i) the number and value of construction projects in these two cities are stable and relatively higher compared to other cities in recent years; and (ii) Shanghai and Beijing, as the business centre and capital of China respectively, offer greater stability in terms of policy and governance which provide for a fairer business environment for foreigners than the other cities. The *Yearbook of Shanghai Foreign-invested Enterprises* and the *Yearbook of Beijing Foreign-invested Enterprises* are databases listing foreign-invested enterprises in various industries. The documents for the categories of construction, real estate development and social service were used as the sampling frames from which the sampling was drawn. Since the number of foreign firms is not large (see Figure 1.3), the survey packages were sent by mail to all the enterprises listed in these sample frames. After the mail survey was completed, telephone calls were made to all the firms to request for personal interviews.

5.6 Explanation phase

The purpose of the explanation phase is to understand the reasons to explain the phenomenon (Rubin and Babbie, 2006). The quantitative data obtained from the questionnaire survey was subjected to statistical analyses. The objectives of the research, which are to identify the critical strategies to achieve competitive

performance and the important practices that foreign firms can adopt to allow them to conduct these strategies when operating in China, can be achieved in three steps:

(i) identifying the important practices;

(ii) identifying critical strategies; and

(iii) understanding the effects of critical strategies on competitive performance.

To complete these three steps, two main statistical analysis techniques, t-test and structural equation modelling (SEM), were used. T-test was helpful in identifying the important practices adopted by foreign firms. The results of the last two steps were achieved by SME. In particular, the critical strategies were identified through factor analysis on SEM. The influences of the critical strategies on competitive performance were achieved by Partial Least Square on SEM.

The t-test and SME are explained in greater detail in the following sections. The rules and requirements for running these two techniques are presented as well.

5.6.1T-test analysis

T-tests were carried out to identify the important practices of the population, that is, foreign firms operating in China.

For each practice under each competitive strategy (Part 3 of the questionnaire; see Appendix 1), the null hypothesis (H_0) and the alternative hypothesis (H_1) are set out below:

H_0:$\mu \leq \mu_0$ (The practice is not adopted.)

H_1: $\mu > \mu_0$ (The practice is significantly adopted.)

The decision rule is to reject H_0 when $p<0.05$. In this study μ_0 is the rating at neutral, and in a 7-point Likert scale, this is 4. Therefore, if the calculated p-value is smaller than 0.05, the null hypothesis will be rejected and the alternative hypothesis will be accepted.

The practices that are statistically significant are used as the variables in the SME.

5.6.2 Structural equation modeling (SEM)

SME was used to analyze the survey data. The advantages of SEM are evident when it is compared with other relationship analysis techniques, which is covered in Section 5.5.2.1. The types of SEM and the tools for analyzing the data of SEM (Section 5.5.2.2) are useful for understanding the contents and characteristics of SEM.

In the following two sections, the process of running the data and the rules of validating

the results are presented.

5.6.2.1 Relationship analysis techniques

There are a number of different statistical techniques that can be used to analyze the relationships among variables. Based on the knowledge provided by researchers (Sharma, 1996; William and Matthew, 1992), these include simple regressions, t-test, analysis of variance (ANOVA), discriminate analysis, logistic regression, multiple regression, multivariate analysis of variance (MANOVA), cluster analysis, principal components, factor analysis, canonical correlation analysis (CCA) and multiple- group discriminate analysis (MDA). The choice of technique for use in any research is based on its fit in two aspects. First, the aim of applying the technique must match the objective of the research. Second, the data collected through research must be compatible with the situation in which the technique can be applied, that is, the assumptions of the techniques.

The following two paragraphs present the two approaches to classify these techniques. The different categories are helpful in identifying the aims of the techniques as well as the situations where the techniques can be applied.

William and Matthew (1992) classified these techniques into two categories – dependence and interdependence methods. Dependence methods are used to

analyze the association between two sets of variables. If the interest is centred on the mutual association across all variables with no distinction made among variable types, one can use the interdependence methods. Simple correlation analysis, factor analysis and cluster analysis are interdependence methods. As shown in Table 5.4 these three techniques focus on identifying the correlations among the data rather than the data's nature as being independent or dependent.

Table 5.4 Dependence and Interdependence techniques

Dependence Models	**Interdependence Models**
Simple Regression T-test Multiple Regression Analysis of Variance (ANOVA) Discriminant Analysis Multiple-Group Discriminant Analysis (MGD) Logit Analysis Multivariate Analysis of Variance (MANOVA) Canonical Analysis(CA)	Principal Components Factor Analysis Multidimensional Scaling Cluster Analysis
IF: the interested centers on the association between two sets of variables, where one set is the realization of a dependent or criterion measure	**IF**: the interest centers on the mutual association across all variables with no distinction made among variable types

Adapted by author based on William and Matthew (1992)

In this study, factor analysis was appropriately used to achieve the results of one objective – to identify the critical strategies utilized by foreign firms. However, the other objective, which is to identify the effects between two sets of variables – one set consisting of measurements of competitive performance and the other set consisting of measurements of each critical strategy, was achieved by using dependence methods.

Another approach to classify these techniques is based on the type and number of variables involved and the type of measurement scales used. A metric scale consists

of measurements that fall along a continuous scale, while a non-metric scale refers to discrete or count data. Figure 5.2 shows combination of the classification by researchers (William and Matthew,1992; Sharma, 1996) and that canonical analysis, MANOVA and multiple regression are appropriate for analyzing the data collected in the survey since the dependent variables in this study are metric ones.

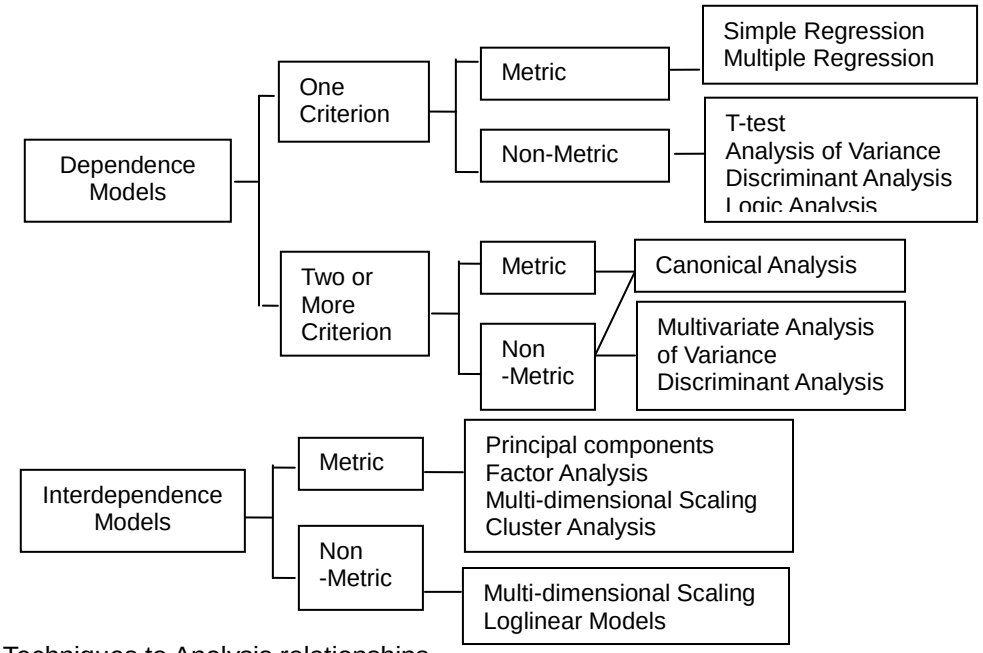


Figure 5.2 Techniques to Analysis relationships
Adapted from William and Matthew,1992; Sharma, 1996

Among the dependence statistical methods, the multiple regression modelling technique is one of the commonly adopted tools in construction research to assess the strength of influence of multiple independent variables on a dependent variable (Churchill and Lacobucci, 2005). In the case where there is only one independent variable, it is called a simple regression analysis. The next common dependence method is the ANOVA, which is a statistical extension of the t-test that can compare the means of three or more groups of sample data simultaneously. It can also use two or

more factors to define the groups to provide a better understanding of the data set (Churchill and Lacobucci, 2005). In the case where there is more than one dependent variable, it is known as MANOVA. Cannonical Correlation Analysis (CCA) can be used to analyze the relationship between two sets of measured variables (Tabachnick & Fidell, 2001). One set may be viewed as the predictor variables while the other set may be considered the criterion or outcome variables. Similar to multiple regression, where the predictor variables are combined to form a single variate (a linear combination), canonical correlation is used to develop variates for both the predictors and the outcomes.

Based on the above review, it seems that three dependence methods – multiple regression, MANOVA and CCA – are appropriate candidates to help achieve the objective of identifying the effects of critical strategies on competitive performance in the Chinese construction market.

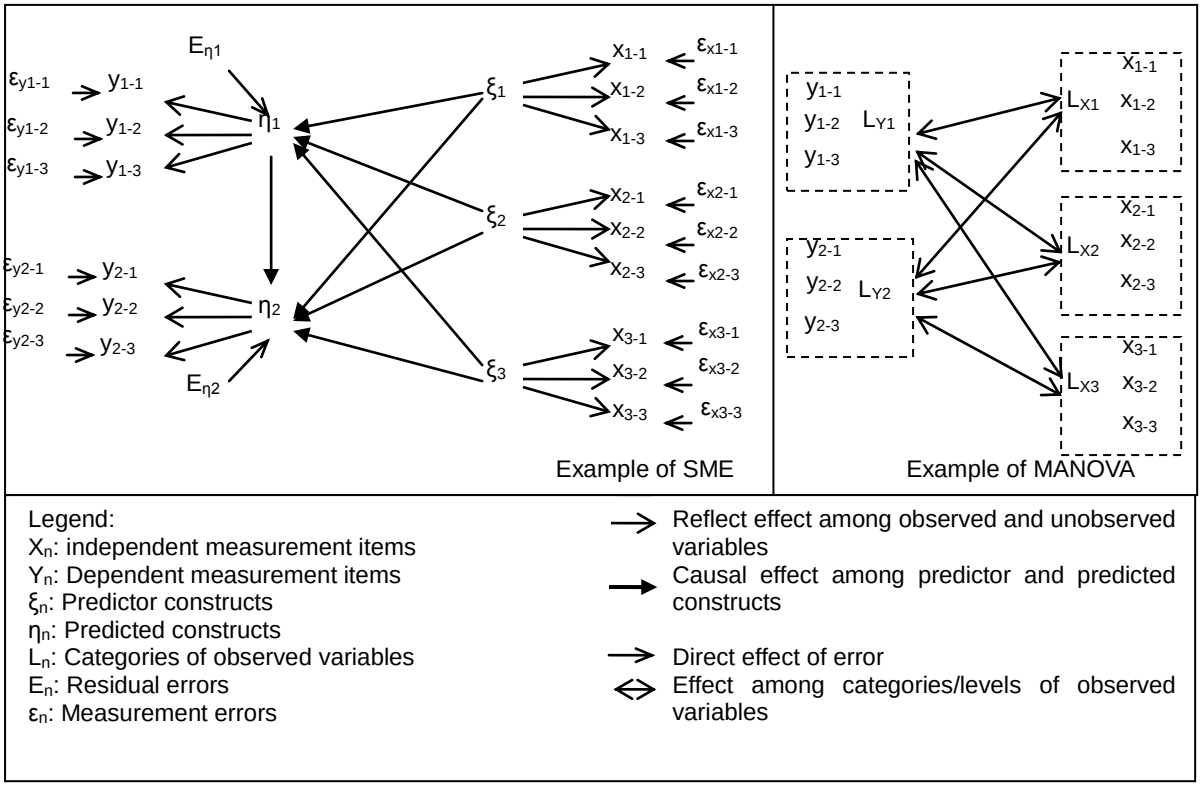
5.6.2.2 Definition of SEM

Before making a choice among multiple regression, MANOVA and CCA, there should be further study of the relationship techniques that focus on structural equation modelling (SEM). The functions of SEM show that it is better than the other three modelling techniques for this research.

SEM has been widely used in social and behavioural research for developing and testing theories through the use of survey data. Besides being used in business marketing studies (Matzler et al., 2007; Jensen, 2008) and organization behavioural studies (Wang and Li, 2007), SEM has also been applied in construction-related researches in recent years, for example, the works done by Dulaimi et al. (2005) and Aibinu et al. (2008).

As shown in the left column of Table 5.5, there are predicted variables and predictor variables in SEM. The structure of SEM is complex as it comprises many layers of general and latent variables, and at the same time, many relationships are found in it (Churchill and Lacobucci, 2005). Latent variables that cannot be directly observed are named as “constructs” in this study, in line with the general convention. Predicted constructs are unobserved dependent variables, while predictor constructs are unobserved independent variables that are used to predict other constructs. For example, η_s are predicted constructs, which represent competitive performance in this study, and critical strategies are predictor constructs, which are ξ_s in Table 5.5.

Table 5.5 Comparison between SME and MANOVA



Both predictor and predicted constructs are measured by their corresponding blocks of observed variables or measurement items. In this research the observed variables in respective blocks are named as measurement items. SME focuses on the prediction and modelling of constructs that are inferred from measurement items (Schumacker and Lomax, 2004).

Compared to other relationship modelling techniques, the SEM technique is more flexible in modelling (Chin and Newstead, 1999). A structural equation model is characterized by its ability to predict multiple and interdependent relationships. This is much better than multiple regression which can only be used in the case where there is only one dependent variable. SEM is also better than canonical correlation analysis

because it can assess the presence of individual constructs and their interdependent relationships without being contaminated by measurement errors (Dilalla, 2000). The purpose of canonical correlation analysis is to explain the relationship of the two sets of variables, not to model the individual variables, which can lead to problems in the interpretation of the variates (Stevens, 2001). The difference between SEM and MANOVA is shown in the right column of Table 5.5. Structural equation modelling is able to explain individual measurement items, which is better than MANOVA which can only explain predicted variates after they are classified into limited levels.

In addition to the ability to allow for measurement errors in all observed variables, the SEM is a comprehensive measurement model having incorporated extensive statistical functions – confirmatory factor analysis and path analysis – into its modelling framework (Bollen and Lennox, 1991). The integration of these two techniques makes it possible to analyze the interdependent and dependent relationships among all variables in a single mode, which ensures a maximally efficient fit between data and model (Amoroso and Cheney, 1991).

Confirmatory factor analysis (CFA) is an extension of the exploratory factor analysis (EFA), which contains inferential statistics that test the uni-dimensionality of a set of measurement items and the significance of the factor loadings of measurement items. This makes SEM more than just an exploratory method whose results may not

reproduce the relationships among the variables in another data set (Nunnally, 1978).

The function of path analysis in the statistical framework ensures that SEM facilitates the specification and examination of multiple relationships between constructs based on prior assumptions derived from literature (Kline, 1998). These complex relationships cannot be conducted with a standard regression analysis (Dilalla, 2000). The detailed concepts and contents of exploratory factor analysis, confirmatory factor analysis and path analysis functions will be discussed in the process of validation section (see section 5.7.2).

5.6.2.3 Types of SEM

There are two SEM-based analytical approaches – the covariance-based approach and the component-based approach. The covariance-based approach has been well accepted in social science research and is almost indistinguishable from the generic term SEM (Chin, 1998a). The covariance-based SEM approach has been associated with social science research since the 1970s when Joreskog (1973) developed the concept of maximum likelihood covariance structure analysis and subsequently industrialized it into the computer software known as LISREL (Joreskog and Sorbom, 1978). Following the increasing popularity of the covariance-based SEM approach, other software packages have been commercialized over the last few decades, such as AMOS, EQS, Mplus, SEPATH and RAMONA.

The component-based approach, which is also known as the partial least square (PLS) method, is the other SEM-based analytical approach (Wold, 1975; Fornell and Bookstein, 1982). The PLS method is a variance-based causal modelling approach developed in the 1960s by Herman Wold who presented iterative procedures using least square estimation or single- and multiple-component models for canonical correlation (Wold, 1975). According to Wold (1975), PLS could be used to avoid some restrictive assumptions underlying the maximum likelihood estimation of LISREL. Nonetheless, Wold (1982) and Chin and Newstead (1999) are of the view that PLS and LISREL are complementary rather than competitive in that they complement one another's weaknesses. There are also commercial and academic software packages available for analyzing PLS-based models such as LVPLS, PLS-GUI, Visual PLS, PLS-graph and SmartPLS.

The differences between the covariance-based and component-based SEM approaches may be found in their objective, approach, assumptions, parameter estimation, latent variable score and sample size requirement.

In particular, the main difference between these two approaches lies in their objective. The covariance-based approach is best used for theory testing and development, while the component-based approach is more oriented toward predictive applications (Joreskog and Wod, 1982). In the area of estimation, the covariance-based approach

uses maximum likelihood estimation and attempts to minimize the difference between the sample covariance and those predicted by the model. The component-based approach, on the other hand, uses least square estimation and attempts to maximize the variance explained by constructs and parameter estimates by minimizing each residual variance separately for improved prediction of corresponding constructs (Chin and Newstead, 1999).

Comparing the assumptions for using these two approaches, the covariance-based SEM approach tends to be more restrictive and problematic to use than the component-based approach (Fornell and Bookstein, 1982). When using the covariance-based approach, the observations should be normally distributed and independent of one another. Secondly, there must be a large sample size ranging from 200 to 800 sets of data. On the other hand, the component-based approach, being a more exploratory approach (Chin et.al.2003), is not constrained by the normality assumption and does not require a large sample size. Besides, it allows the use of non-interval scaled data.

In addition, the component-based approach tends to estimate constructs as linear combinations of observed variables using weight relations, thereby avoiding indeterminacy and providing an exact definition of constructs' score (Fornell and Bookstein, 1982). Since this approach operates the relationships between variables

and their corresponding constructs as a series of interdependent ordinary least square (OLS) regressions, there are no identification problems for recursive PLS models (Chin and Newstead, 1999).

According to Chin et al. (2003), the component-based SEM approach is a more comprehensive modelling technique since it comprises many other techniques, such as canonical correlation analysis, redundancy analysis, multiple regression, MANOVA and factor analysis. Hence, it is more suitable for explaining the relationships among multiple predicted and predictor constructs. From now on, the component-based approach will be referred specifically as “PLS” to facilitate the discussion that follows.

The PLS approach, however, has its disadvantages. First, the correlations of observed variables tend to be underestimated, whereas the correlations of the observed variables with their respective constructs tend to be overestimated (Dijkstra, 1983). Second, the parameter estimates in PLS are not as efficient as full-information estimates where the jackknife or bootstrap procedure is required to obtain estimates of standard errors of the parameter estimates (Dijkstra, 1983).

In reviewing the characteristics of the two SEM approaches, the PLS approach was considered an appropriate tool for data analysis in this study. The main reason is that PLS can handle a complex model and it requires neither a large sample size nor rigorous restrictions on data distribution. In the case where there are 37 sets of data as

in this study, PLS is more appropriate than the covariance-based SEM approach. Although PLS has its disadvantages, which affect the prediction quality of models (Fornell and Cha, 1994), its shortcomings do not, however, outweigh its suitability for this research. In addition, to obtain the standard errors of the parameter estimate, the bootstrapping method was adopted in this study.

5.7 PLS modelling process

Figure 5.3 shows the four steps involved in the PLS modelling process. The first step is to set up the PLS model. Then survey data is inputed into the Smart PLS software to execute the model and estimate the parameters in the second step. During this process, confirmatory factor analysis, path analysis and bootstrapping techniques are used. The third step is to test and validate the model. The second and third steps may be done iteratively along with eliminating certain inconsistent items. The last step is to evaluate the PLS structural model.

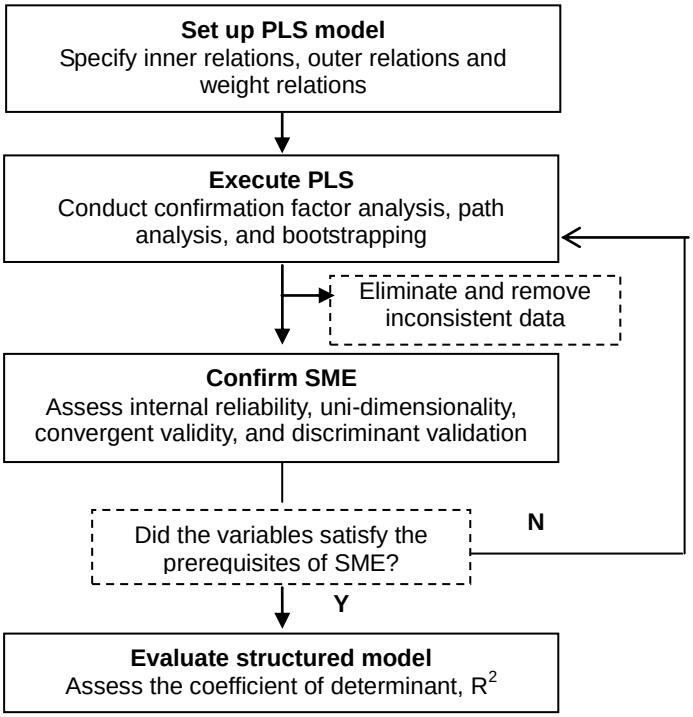


Figure 5.3 The PLS modeling process

5.7.1 PLS model establishment

This section explains how the PLS model of this study is established. This PLS model consists of three types of relationships: (i) inner relationship which specifies the relationships between constructs,(ii) outer relationship which specifies the relationships between constructs and their respective observed variables, and (iii) weight relationship which is used to estimate the scores of constructs.

The PLS model consists of predictor constructs (or independent constructs, ξ) relating to important practices. These predictor constructs form the key determinants for the competitive performance. The relationships between the competitive performance and critical strategies were determined through the parameter estimates (λ) to facilitate the

development of structural equations among constructs.

5.7.2 Modelling process

In the PLS approach, the parameter estimation is based on the ability to minimize the residual variance of dependent variables through a three-stage iterative estimation algorithm (Wold, 1982). This process is summarized by Lohmoller (1989) and presented below.

Stage 1 consists of an iterative scheme of simple or multiple regressions that estimates weights and the scores of constructs. Based on a random start matrix of initial outside approximation, the inner weights are first estimated, followed by an inside approximation. Next, the outer weights are determined and followed by an outside approximation. This process continues until convergence is obtained.

In stage 2, factor loadings and path relationships are estimated using OLS regression in which each dependent variable in the model is regressed on its respective independent variables.

In stage 3, the means and parameters of the constructs and observed variables are estimated.

To ensure these three stages can be executed, statistical functions that play a

supporting role include confirmatory factor analysis, path analysis and bootstrapping.

5.7.2.1 Confirmatory factor analysis

Confirmatory factor analysis (CFA) is typically used in a deductive mode to test a hypothesis about the relationships among a set of observed variables (Hoyle, 2000). As a result, the interrelationships among variables within a CFA model (or measurement model) are based on theoretical assumptions rather than revealed through a discover-oriented mode.

Figure 5.4 provides an overview of the CFA. The single-headed arrows suggest the causal or predictive relationships, and it can be seen that each measurement item is affected by two unmeasured influences – the causal influence that one shares with other measurement items directing from the construct and the distinct causal influence directing from the measurement error of respective measurement items. Based on the information provided in Figure 5.5, the causal relationships are translated directly into statistical form through a set of measurement equations as shown below (Eq. 5-1):

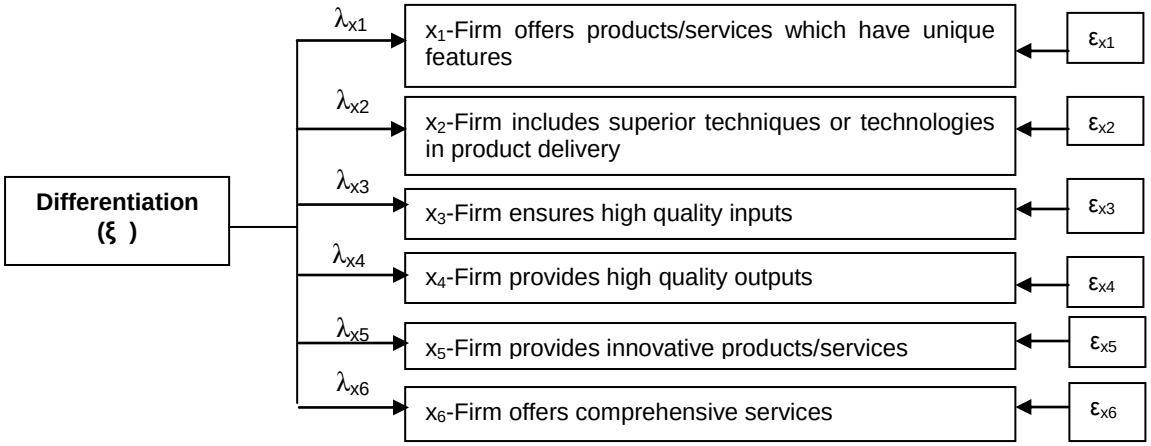


Figure 5.4 An example of overview of CFA

$x_i=\lambda_{xi}\xi+\varepsilon_{xi}$ Eq. 5-1

$x_1=\lambda_{x1}\xi+\varepsilon_{x1}$ Eq. 5-1a

$x_2=\lambda_{x2}\xi+\varepsilon_{x2}$ Eq. 5-1b

$x_3=\lambda_{x3}\xi+\varepsilon_{x3}$ Eq. 5-1c

$x_4=\lambda_{x4}\xi+\varepsilon_{x4}$ Eq. 5-1d

$x_5=\lambda_{x5}\xi+\varepsilon_{x5}$ Eq. 5-1e

$x_6=\lambda_{x6}\xi+\varepsilon_{x6}$ Eq. 5-1f

For each measurement equation, the variability in the i^{th} measurement item is an additive function of the i^{th} differentially weighted factor, $\lambda_{xi}\xi$ (ξ is the construct score), and the i^{th} unique factor (or measurement error), ε_{xi}. Parameter estimates of these direct effects are called weights, which are generally interpreted as regression coefficients.

To test the significance of estimates is to reject the hypothesis that parameter equals to zero. In this study, t-test analysis was used. The statistical power of each individual

measurement item can be established based on t-statistic evaluated against the standard one-tailed criterion. These t-statistics corresponding to the p-value are based on 600 bootstrapping runs (see Section 5.7.2.3).

5.7.2.2 Path analysis

Path analysis (PA) is an extension of the multiple regression modelling technique. It is used in SEM to examine the relationships between constructs. Beyond the capability of traditional regression analysis, PA allows for the analysis of more complicated models. However, it should be noted that PA cannot be used to establish causality or even to determine whether a specific model is correct. It can only determine whether the data are consistent with the model.

In this study, the directional paths drawn between the identified constructs in the model are based on substantive literature review. A total of two structural equations were formed in this study, representing the inner relationships among the constructs identified. Eq5-2 is used as an example:

$$\eta_i=\beta\xi_i+\varepsilon_{\eta i} \qquad \text{Eq. 5-2}$$

In this formulation, β is the path coefficient linking strategies (ξ) and competitive performance (η). The residual variance is assumed to reside in ε_n. Here, β is the standardized regression weight, identical to the β weight of a multiple regression

model. The sign of path coefficient should correspond to what the model predicts and be statistically significant. In this study, significance of path coefficient is done by bootstrapping.

5.7.2.3 Bootstrapping

Bootsrapping is a technique to re-sample data with replacement from an original sample, originated in the late 1970 by Efron Bradley. Compared to many conventional parametric statistical procedures, the bootstrapping technique shows different in obtaining sample. The sampling distribution in Bootstrapping is developed by obtaining a random sample via re-resampling rather than extracting successive samples repeatedly from a population.

The underlying principle of the boostrapping technique is to generate multiple sub-samples from the pool of data collected, and then draw inferences about the corresponding population and its parameters. From the perspective of researchers (Tinsley and Brown, 2000), it can be used to estimate a range of confidence intervals and to test null hypotheses about the value of the test statistic in a population. In this study, Bootstrapping was used to test the statistical significance of measurement items as well as their weights.

5.7.3 Measurement model validation

Model validation is done to ensure that the established model is consistent with SEM (Rigdon, 1998), and this is a prerequisite in the PLS modelling techniques. According to Rigdon (1998) and O'Leary-Kelly and Vokurka (1998), this model validation involves three aspects.

First, the measurement items should be reliable to establish the constructs. To achieve this reliability, Cronbach's coefficient alpha and composite reliability index are used to test the internal reliability. Item-to-total correlation is used to identify the inconsistent items that exert a negative influence on the internal reliability. Second, measurements must be uni-dimensional (Anderson & Gerbing, 1988), which means they are loading on only one construct, so that all association or covariance between the various measurements is entirely mediated by the common factors. In this study, uni-dimensionality is checked by the loadings of each item on the constructs.

Third, measurements should be demonstrated as convergent validity, which means that measurements have relatively high correlations with other measurements of the same construct, and discriminant validity, which means measurements have relatively low correlations with other constructs. These two components of validity capture some aspects of the goodness of fit of measurement models when using SEM techniques (Gefen and Straub, 2005). An acceptable level of both types of validity ensures that

each measurement item correlates strongly with the one construct it measures, while correlating insignificantly with other constructs. In this study, this is tested by item-to-total correlations and the average variance extracted (AVE).

It should be noted that exploratory factor analysis (EFA) is also a way to test validity in the above three aspects, since the principles of EFA dictate that measurement items constituting the same construct must be those with the highest correlations among all. Therefore, relatively high factor loadings of measurements on respective constructs are also used as a way to assess the validity of the model.

5.7.3.1 Cronbach's alpha reliability

The Cronbach's alpha reliability test is used to examine measurement reliability. By using it, the extent to which independent measurement items correlate among one another is tested (Churchill, 1979). The results show the degree to which individual multiple-item scales produce consistent and stable scores based on a series of repeated tests (Cronbach, 1970). A high alpha coefficient indicates that the measurement items of a construct are highly correlated, and vice versa (Pedhazur and Schmelkin, 1991).

There is no general consensus on the acceptable value of an alpha coefficient in assessing the consistency level of a construct. In this study, a threshold value of 0.70

was adopted to determine the consistency level of constructs, following Nunnally (1978).

5.7.3.2 Item-to-total correlation

The purpose of item-to-total correlation is to identify inconsistent measurement items in individual dimensions. It is calculated for the subscale and whole scale of multi-dimensional constructs. The subscale is calculated based on the data of individual dimensions of respective constructs, while the whole scale is calculated based on the data obtained within respective constructs. The inconsistent items should be eliminated and this may considerably increase the Cronach's alpha coefficient of constructs.

According to Nunnally (1978), measurement items with item-to-total correlation scores less than 0.30, for both subscale and whole scale, are considered as inconsistent.

5.7.3.3 Composite reliability index

The composite reliability index, obtained from CFA in PLS, can be used to assess the internal reliability of measurement items of individual constructs. It follows that a high composite reliability index indicates high internal reliability, and vice versa. Hair et al. (1998)'s suggestion that the threshold value of composite reliability index is 0.70 is adopted in this study.

5.7.3.4 AVE

Average variance extracted (AVE) represents the overall amount of variance in the measurement items accounted for by individual constructs (Fornell and Larcker, 1981). AVE can be used as a tool to evaluate the convergent validity of the data, since a high AVE indicates that each measurement item correlates strongly with the one construct it purports to measure (Crocker and Algina, 1986).

On the other hand, AVE is also used to assess the discriminant validity of the construct. To test whether the measurement items share more variance with their constructs than with other constructs, a comparison is done between “the square root of the AVE value of a construct” and “the correlation between measurement items and other constructs” (Fornell and Cha, 1994).

5.7.3.5 Factor loading

In general, factor analysis refers to a collection of models for explaining the correlation among variables in terms of more fundamental entities called “factors” (Cudeck, 2000). The goal is to summarize complicated patterns of correlations between observed variables into a simpler explanatory framework. A factor is a construct or latent variable that is essentially outside of measurement. Generally, measurement items with good measurement properties should exhibit higher factor loadings on their constructs. In other words, measurement items should show low factor loadings on other constructs.

Hence, high factor loadings can be used as a tool to assess uni-dimensional validity, convergence validity and discriminant validity.

First, all measurement items should first pass the KMO test, which is used to test the appropriateness of data for factor analysis performance (Hair, et al., 1998). Second, eigenvalues should be higher than 1. Eigenvalues assess how much variance is contained in a set of measurement items (Green and Carroll, 1976). For example, an eigenvalue of 4.32 explains 43.2% of the total variance contained in a set of measurement items. The number of factors extracted from measurement items should be decided by the number of eigenvalues that are higher than 1. Third, none of the measurement items should have high loadings on more than one construct (Hair et al., 1989 and Comrey, 1973). This is important to ensure the convergence validity of the construct and a clean and rigid factor structure (Comerey, 1973). To avoid cross loading, the varimax rotation method was used in an attempt to make as many factor loadings as possible to be near zero and to maximize as many of the others as possible.

Comrey (1973) suggested that factor loadings of 0.45~0.54, 0.55~0.62, 0.63~0.70 and >0.70 are considered as fair, good, very good and excellent respectively. In this study a measurement item with factor loading less than 0.45 is considered an inconsistent item. In addition, a measurement item with factor loadings on more than

one factor higher than 0.45 is considered an inconsistent item.

5.7.3.6 Rules on removal of measurement items

The removal of any inconsistent or insignificant measurement item is subject to a set of rules as shown in Table 5.6. By following this set of rules, it ensures that the constructs to set up the model are consistent with SEM, which will then ensure that the results from the PLS analysis are reliable and effective.

Table 5.6 The regulations and rules to remove variables

Regulation and Rules	Intention
-Constructs and their factor structures or dimensions with Cronbach's alpha coefficient should high than 0.70 (Nunnally, 1978) -Measurement items with a threshold level that less than 0.30 in their item-to-total scores, for both subscale and Whole scale are considered as inconsistent (Nunnally, 1978) -Reliability of linear combination scores of multidimensional constructs should exceed the threshold value of 0.70 in order to retain specific multi-dimensional constructs	-To ensure reliability of linear combination scores is high -To ensure the internal consistency is high
-Factor structures or dimensions of individual constructs that account for variance less than 1 are not considered (Kaiser, 1960) -Individual factor structures should have at least three measurement items that load highly on them (Norusis, 2007) -Measurement items with a factor loading that less than 0.45 are considered inconsistent (Comrey, 1973)	-To ensure that variance of measurements having be extracted by factors is sufficient -To ensure the factor structures are specific -To ensure that the convergent validity of the factor structure is high
-Constructs and their factor structures should high a composite reliability index high than 0.70 (Hair et al., 1998) -Individual measurement item's t-statistic should be significant at least at the $p<0.05$ (Gefen and Staub, 2005) -Individual constructs with AVE value should be high than 0.50 (Fornell and Larcker, 1981) -The square root of the AVE should be higher than the correlations among constructs in the model (Fornell and Larcker, 1981)	-To ensure the internal consistency is high -To ensure the convergent validity is high -To ensure the discriminant validity is high

5.7.4 Structural model evaluation

The evaluation of the structural model is done by two approaches – the predicted power of the model and the variance that is explained by the model.

A predictor construct that explains less than 1.5% of the variance in a predicted construct should be eliminated and the model should be trimmed by re-estimating. Falk and Miller (1992) stated that this elimination of arrows or paths, followed by the recalculation of the model, is the most inductive approach to trim models. The percentage of variance in a predicted construct explained by predictor construct (PV) is given by:

$PV=(\beta X r) X100\%$ E.q 5-3

Where β and r are the path coefficient and correlation between predictor and predicted constructs respectively.

In evaluating the structural model, the R^2 or variances explained for predicted constructs should be more than 0.10 as recommend by Falk and Miller (1992). This indicates that more than 10% of the variance in predicted constructs is accounted for by the predictor constructs. The significance of R^2 or variances explained by all predicted constructs is evaluated based on overall F-test as shown below:

$F= [R^2/m]/[(1-R^2)/(N-m-1]]$

Where m is the number of predictor constructs and N is the number of respondents. F-statistic is based on F-distribution with degree of freedom m and (N-m-1). If the calculated F-statistic exceeds the critical value (at a=0.05 or a=0.1), the null hypothesis that all the predictor constructs explain zero variance in predicted constructs should be rejected.

The numerical value of R^2 and the significance of R^2 should be considered together. The numerical value should be ≥ 0.10 and statistically significant (Falk and Miller, 1992).

5.8 Validation of results

After the statistical analysis was completed and the models developed, a validation exercise was conducted with six subject matter experts, who were randomly selected. They are the experts selected from other foreign firms who were not involved in the data collection process. The data collection instrument for the validation process was an amended questionnaire which showed only the significant variables of the model. Inconsistent items uncovered in the data analysis stage were removed from the questionnarie. During this validation process, the approach of retrospective reporting of key information was adopted to ensure that information, whether objective or subjective, is obtained (Golden, 1992). The questionnaires were sent to the subject

matter experts via email.

5.9 Summary

In this research, PLS was chosen as a technique to do statistical modeling. The reason of using PLS mainly lies in the nature of data of this research. Compared to other modeling techniques, PLS sets less prerequisites to the data sample. At the same time, as one of the second generation multivariate techniques, PLS can identify more and broader information from the data.

PSN framework is specified by PLS modeling technique according to the objectives proposed in the study. The whole process of modeling covers the establishment of model, the execution of the model, the confirmation of the model and the evaluation of the model. There are repeats and cycling of the process in order to identify the statistically significant relationships and effective path coefficients.

The results of the modeling process were presented in next Chapter.

CHAPTER6 RESULTS AND DISCUSSION

6.1 Introduction

This chapter reports on the fieldwork. Based on the research design given in Chapter 5, a questionnaire survey of foreign firms operating in China's construction market was undertaken. After obtaining the completed questionnaires, the data were checked and entered into the SPSS and Smart PLS software. The findings of the survey relating to competitive practices adopted by foreign firms, the underlying structure of Porter's generic strategy, Sun Tzu's strategy and Network strategy (PSN model), and the important practices to achieve critical strategies as well as strategies to achieve competitive performance will be presented in the following sections.

Before discussing the results, the profile of interviewees and the response rate are examined (Section 6.2) in order to establish the reliability of sample data. This is followed by Section 6.3, which present competitive practices adopted by foreign firms and the results of t-test of all practices. The underlying structure of the PSN model is presented in Section 6.4. Section 6.5 shows the results of critical strategies to achieve competitive performance as well as important practices to achieve the critical strategies.

6.2 Sample profile

The survey packages were first sent out on 1 June 2009 and followed up with telephone communication. The responses were received between 15 June 2009 and 11 November 2009. Before the mail survey was carried out, all the foreign construction related consultancy firms listed in the “Yearbook of Shanghai foreign-invested enterprises” and “Yearbook of Beijing foreign-invested enterprises” were contacted via telephone calls. The aim of the telephone call was to find out if they would be willing to participate in the survey. Those who said that they definitely would not participate were removed from the survey list. After the telephone calls, 138 firms which did not object to participating were sent survey packages. Of the138 survey packages sent out, 37 responses were received, giving a response rate of 26.8%. Based on the returns, the profiles of respondents were analyzed. Table 6.1 summarizes the general information of interviewees’ firms. The items shown in Table 6.1 are consistent with the questions in Part 1 of the questionnaire. It should be note that three questions are with no answers, since the quite low rate of replies respectively. According to “Firm’s profit margin in China”, “Revenue from China, as a percentage of firm’s total revenue” and “Usual contract sum of facilities in China”, the replies are 5, 3, and 1 respectively. The reasons of these low replies rate lie in two aspects. Foreign firms treat the answers to these three questions as private business information. On the other hand, some interviewees also mentioned that they were not familiar with the information of whole

organization which is managed by their headquarters. These responses are reasonable. Firstly, this may be understood as an indirect and polite way for respondents to refrain from providing certain kinds of information, especially if the information is sensitive or private. Secondly, headquarters may not necessarily share all information with its subsidiaries, thus, a managing director of a subsidiary may not know the answer. In the following section, only the items with useful information are discussed.

Table 6.1 Nature of interviewees' firms

Description		**Number**	**Percentage**
Headquarters' business			
Building construction		5	13.5%
Architectural consultancy		24	64.9%
Civil engineering consultancy		14	37.8%
M&E consultancy		21	56.8%
Project management		18	48.6%
Location of headquarters			
Australia		3	8.11%
France		3	8.11%
Germany		3	8.11%
Singapore		10	27.03%
UK		5	13.51%
USA		10	27.03%
Not indicated		3	8.11%
Size of workforce (approximate)			
In China (34 replies) Minimum: 5 Maximum: 2000 Average: 271	<50	11	32.4%
	51-100	8	23.5%
	101-200	6	16.6%
	201-500	4	11.7%
	>500	5	14.7%
Worldwide (30 replies) Minimum: 200 Maximum: 142500 Average: 16482	<1000	8	26.7%
	1001-5000	12	40%
	5001-10000	2	6.7%
	10000-50000	6	20%
	>50000	2	6.7%
Firms' revenue (in US$)	**Minimum**	**Maximum**	**Average**
2005	0.3 M	37.5M	17.4M
2006	0.75M	57.7M	24.3M

Description		Number	Percentage
2007	1.2M	88.7M	28.3M
Firms' market entry into China			
Before 1998		9	24.32%
1999-2003		15	40.54%
2004 onwards		13	35.14%
Minimum years of experience (Years)			2
Maximum years of experience (Years)			32
Average years of experience (Years)			9.2
Location of projects in China			
Beijing		26	70.3%
Shanghai		24	64.9%
Tianjin		9	24.3%
Chengdu		13	35.1%
Suzhou		9	24.3%
Types of facilities undertaken in China			
General building projects		29	78.4%
Industrial projects		15	40.5%
Transportation		7	18.9%
Power		7	18.9%
Water		4	10.8%
Services provided in China			
Design consultancy (architectural and civil engineering)		27	73.0%
City/town planning		11	29.7%
M&E consultancy		13	35.1%
Project management		24	64.9%
Ways firms were selected to provide services in China			
Open competitive bidding		14	37.8%
Selective bidding/prequalification		29	78.4%
Negotiation		19	51.4%
Designation of respondents			
Director (managing director, executive director)		14	45.2%
General manager		4	12.9%
Senior manager (assistant general manager, senior project manager)		13	41.9%
Respondents' years of experience in China			
Less than 5 years		11	36.7%
Between 5 to 10 years		14	46.7%
More than 10 years		5	16.7%
Minimum years of experience (Years)			2
Maximum years of experience (Years)			15
Average years of experience (Years)			7.4

Note: When total is not 100%, rounding off errors have occurred. When $n \neq 37$, this is because some respondents did not provide the information.

6.2.1 Nature of headquarters' business

It can be seen from Table 6.1 that for the majority of the firms had their core business in architectural consultancy, or M&E consultancy. 64.9% of the respondents had experience in architectural consultancy, followed by 56.8%% in management. 48.6% of the respondents' business involved project management. These figures indicate the influence of the foreign firms on a broad range of business on the value chain.

6.2.2 Location of headquarters

The sample comprised foreign firms from six countries, which are Australia, France, German, UK, USA and Singapore. This shows that the foreign operators in the Chinese construction market have diverse nationalities.

6.2.3 Size of workforce

For the size of workforce, it is noted that 32.4% have a workforce size below 50 in the Chinese construction market. Majority (51.8%) of the replies have a workforce size ranging from 51 to 500. Considering the size of firms' workforce worldwide, Table 6.1 shows that 26.7% have a workforce size below 1000 all around the world. More than half of the respondents have a workforce size ranging from 1001 to 50000 worldwide.

6.2.4 Revenue of firms

Of the 37 respondents, 30 of them provided information pertaining to their revenues earned in 2005, 2006 and 2007. This may be attributed to the reluctance of foreign firms to divulge such sensitive business intelligence. The revenue of those who responded ranged between $ 0.3 million and $ 37.5 million in 2005, between $0.75 million and $57.7 million in 2006 and between $1.2 million and $88.7 million in 2007. The average revenues of these three years are respectively $17.4 million, $24.3 million and 28.3 million respectively. This suggests that foreign firms' revenue has grown over the three years.

6.2.5 Number of years firms have operated in China

The following information is derived from the responses of 37 interviewees. Besides the information shown in Table 6.1, result shows that the firms had operated in China for a period of between 2 and 32 years, giving an average of 9.2 years. The years with high number of foreign firms entering China are: 1999 (13.95%), 2003 (19.4%) and 2004 (22.2%). It may be interpreted that the majority of respondents entered into China after it became a member of WTO in 2001. The increase in the number of foreign firms entering the Chinese construction market may be in part attributed to the gradual lifting of certain market restrictions after China had joined the WTO for 3 years.

6.2.6 Location of projects in China

Table 6.1 shows that respondents' projects are mainly in Beijing, Shanghai, Tianjin, Chengdu and Suzhou. Beijing and Shanghai are cities in which respondents have more experiences compared to the others three cities. However, it should be noted that besides these five cities, foreign firms have some experiences in other cities. This shows that foreign firms will not focus their business on one or two cities. The insignificant importance of "Firm serves one or two specific geographic construction market in China" (F1) (see section 6.3) is also a supportive explanation. In the face to face interview, 5 respondents said that they will not narrow their choices to certain big cities. On the contrary, projects in newly industrialized cities are also attractive to them.

6.2.7 Facilities undertaken and services provided in China

Based on the type of facilities foreign firms have developed in China, it is noted that majority of the respondents (78.4%) were involved in general building works, followed by 40.5% in industrial buildings. Majority of the business in China are design consultancy and project management. This suggests that the findings would be more applicable to foreign firms undertaking design of general buildings in China.

6.2.8 Procurement of the services

Table 6.1 shows that majority of the respondents (78.4%) were selected by prequalification, followed by 51.4% by negotiation. 37.8% of the replies are selected through open competitive bidding.

6.2.9 Designation of respondents

As shown in Table 6.1, all respondents are from senior management levels including managing directors, directors, general managers and senior contract managers who play major roles in their companies' operations in the Chinese construction market. The characteristics of these respondents ensure that the information provided by them is noteworthy.

6.2.10 Number of years respondents have worked in China

Thirty of the 37 respondents indicated that they had worked in Chinese construction market for between 2 and 15 years, with an average of 7.4 years. Among these respondents, 36.6% of them have worked in China for less than 5 years, 46.7% of them between 5 and 10 years, and the remaining 16.7% for more than 10 years. This indicates that the respondents are relatively experienced, and would therefore be able to inform the research.

6.3 Important practices—results of t-test

Having discussed the profiles of the interviewees and their firms, this section investigates the important practices adopted by foreign firms in the Chinese construction market.

Using the SPSS software, t-test of the mean was calculated to find out if the practices are significantly adopted. The hypotheses are set up below:

H_0: μ is ≤ 4.

H_0: μ is > 4.

“4” is chosen because on a 7-point scale, “4” is the mean score. Since, only the positive values of practices will be considered as important ones, in this study, the one-tail t-test was conducted in this study.

The null hypothesis is that the practice was “not-adopted” or “moderately-adopted”, and the alternative hypothesis is significantly adopted. When the significance value is larger than 0.05, the null hypothesis was accepted which means that the practice is not adopted or only adopted to a moderate extent. It is then concluded that the practice is not important for obtaining critical strategies.

When the significance level is ≤0.05, which is the 95% confidence level of the test, and

the t value is positive, the null hypothesis was rejected and the alternative hypothesis was accepted. It is then concluded that the practice is adopted to a significant extent, and is therefore an important practice. It suggests that this is important for foreign firms to implement this practice to become competitive.

Respondents were asked the extent to which they adopted the 56 practices when operating in China. Table 6.2 shows that 44 out of the 56 practices are significantly important (t value positive and $p<0.05$). These 44 important practices were used for subsequent data analysis.

Table 6.2T-test of the practices and attributes of competitiveness

Practices under each competitive strategy	T value	Sig. (1-tailed)	Mean value
Cost leadership			
C1 Firm learns continuously	5.351	0.000	5.500
C2 Firm establishes vertical linkages	2.601	0.007	4.750
C3 Firm invests in technology	2.249	0.016	4.556
C4 Firm cuts supplier's prices	0.197	0.423	4.057
C5 Firm reconfigures its value chain	4.091	0.000	5.056
C6 Firm reduces costs in its operations	4.233	0.000	4.889
C7 Firm reduces costs in administrative activities	3.416	0.001	4.833
C8 Firm avoids making changes to the process	0.721	0.238	4.194
C9 Firm's staff undergoes training regularly	2.963	0.014	4.556
C10 Firm offers low price for its product/service	-1.944	0.030	3.389
Differentiation			
D1 Firm offers products/services which has unique features	6.065	0.000	5.556
D2 Firm includes superior design techniques or adopts superior technology or management in product/service delivery.	5.668	0.000	5.556
D3 Firm ensures the quality of inputs is high	8.919	0.000	5.944
D4 Firm provides high quality outputs (products and services)	13.388	0.000	6.167
D5 Firm provides innovative products/services	4.568	0.000	5.139
D6 Firm offers comprehensive services to clients	7.208	0.000	5.694
Focus			
F1 Firm serves one or two specific geographic construction market in China (eg, Beijing, Shanghai)	0.830	0.206	4.278
F2 Firm operates in a specific construction market segment (eg, residential, hospital, infrastructure)	2.810	0.004	4.861
F3 Firm serves only a specific group of clients	3.595	0.001	5.028
F4 Firm offers a focused range of products/services	4.168	0.000	5.111
Swiftness			
S1 Firm achieves fast delivery from suppliers	9.335	0.000	6.083
S2 Firm owns fast internal communication	5.978	0.000	5.417
S3 Firm accommodates the client's incessant requests	4.648	0.000	5.278

Practices under each competitive strategy	T value	Sig. (1-tailed)	Mean value
S4 Firm takes actions to improve the speed of execution	4.921	0.000	5.028
S5 Firm innovates its service/product continuously	4.249	0.000	5.167
S6 Firm collaborates actively	3.505	0.001	4.972
Adaptability			
A1 Firm creates an adaptable organizational structure	4.972	0.000	5.278
A2 Firm does innovative marketing for products in advance	4.821	0.000	5.139
A3 Firm establishes organizational culture based on adaptability mechanism	3.534	0.001	4.917
A4 Firm offers options when faced with changes during the implementation	4.938	0.000	5.250
A5 Firm encourages employee participation in decision making	2.844	0.004	4.778
A6 Firm empowers middle management to evaluate and execute changes	3.204	0.002	4.806
A7 Firm has a post-change responsive system to pay compensation for losses arising from unexpected events.	1.754	0.044	4.444
Market Intelligence			
MI1 Firm obtains information from local agents	-1.392	0.086	3.528
MI2 Firm appoints dedicated staff/team to deal with government approvals.	0.754	0.278	4.278
MI3 Firm assesses risks comprehensively before embarking on a project in China	5.701	0.000	5.444
MI4 Firm equips itself with good information and communication infrastructure	4.830	0.000	5.333
MI5 Firm equips itself with good information analysis infrastructure	2.415	0.016	4.667
MI6 Firm accesses broad market information	5.000	0.000	5.250
Network			
N1 Firm establishes mutual trust among other firms in its network	2.547	0.008	4.694
N2 Firm has long-term commitment with other firms in the network	4.334	0.000	5.222
N3 Firm resolves conflict efficiently	4.162	0.000	5.167
N4 Firm seeks mutually supportive actions with other firms in its network	3.445	0.001	4.778
N5 Firm engages in multi-level partnering	5.125	0.000	5.389
N6 Firm achieves political backing from the Chinese government	-0.249	0.403	3.917
N7 Firm achieves political backing from home country's government	0.743	0.232	4.250
N8 Firm is a member of a consortium in China	-0.949	0.175	3.639
N9 Firm partners with local PRC firms	3.831	0.001	5.083
N10 Firm collaborates with its competitors to add value to its product/service	0.107	0.457	4.028
N11 Firm encourages information communication across hierarchies	5.193	0.000	5.306
N12 Firm obtains resources from other firms in its network	3.976	0.000	4.778
N13 Firm establishes routes to share knowledge with other firms in its network	4.226	0.000	4.833
N14 Firm sets up network proactively	1.818	0.039	4.472
N15 Firm sets up network contingently	-1.603	0.059	3.556
N16 Firm sets up compatible goals with partners	4.782	0.000	5.167
N17 Firm enlarges the number of partners	1.524	0.068	4.472
Competitive performance			
P1 Firm is competitive in winning large number of projects	-0.110	0.457	3.972
P2 Firm is competitive in winning large value of projects	1.032	0.155	4.278
P3 Firm is profitable	1.390	0.087	4.389
P4 Firm's products/service quality is competitive	13.388	0.000	6.167
P5 Firm is competitive in achieving client satisfaction	7.185	0.000	5.528
P6 Firm is competitive in achieve good public image	5.452	0.000	5.278
P7 Firm is competitive in delivering project ahead of schedule	3.369	0.001	4.861

As seen in Table 6.2, all practices under categories of “differentiation”, “swiftness” and “adaptability” are important.12 practices were identified as unimportant practices by foreign firms operating in the Chinese construction market, and they are:

- Firm cuts supplier’s prices (C4)
- Firm avoids making changes to the process (C8)
- Firm offers low price for its product/service (C10)
- Firm serves one or two specific geographic construction market in China (eg, Beijing, Shanghai) (F1)
- Firm obtain information from local agents (MI1)
- Firm appoints dedicated staff/team to deal with government approvals (MI2)
- Firm achieves political backing from the Chinese government (N6)
- Firm achieves political backing from home country’s government (N7)
- Firm is a member of a consortium in China (N8)
- Firm collaborates with its competitors to add value to its product/service (N10)
- Firm sets up network contingently (N15)
- Firm enlarges the number of partners (N17)

Under “cost leadership” category, cutting supplier’s prices (C4) is not an important practice. This may be because for foreign firms, their suppliers already have low profit margins. For example, the services/products purchased from local design firms are usually detailed designs to comply with local codes and regulations (Xu et al., 2004). This entails detailed and mundane work which generally yields low profit margins. The other reason may be the lack of “guanxi” of foreign firms resulting in their not having the necessary bargaining power (Xu et al, 2004), as compared to their competitors. This is supported by Bacharach and Lawler’s (1984) statements that the availability of alternative alliances is important to determine whether the bargaining power can be secured.

The replies of the survey show that “firm offers low price for the services/product” (C10) is significantly not adopted. This may be interpreted as foreign firms offering high price for their products/services. Porter (1980) identified that low costs will permit a firm to sell relatively standardized products that offer features acceptable to many customers at the lowest competitive price and such low prices will gain competitive advantage and increase market share. Therefore, it can be implied from the results that foreign firms do not practice low pricing to achieve cost leadership. As Ling et al., (2005) found that the Chinese market is very price competitive, to win projects in China, foreign AEC firms must offer competitive prices. However, based on a case study, Ling et al. (2005) also found that a foreign firm can compete with local Chinese firms by lowering fees as much as 20% (Ling et al., 2005). However, offering low price only worked as a short-term approach to enable foreign firms to keep a foothold in China and only firms with “deep pockets” can adopt this practice. Based on the above analysis, C10 will not be considered as a candidate of measurement items in the factor analysis.

Under the categories of “Focus”, “firm services one or two specific geographic construction markets in China” (F1) is eliminated from the pool of important practices by respondents. This suggests that foreign firms do not confine the location of their practices to one or two cities. This applies especially to those firms which choose follow their clients as an entry strategy into China, in which case, the location of the projects are determined by their clients.

Among the practices under “Market intelligence”, “obtain information from local agents” (MI1) and “appointing staff/team to dedicatedly deal with government approvals” (MI2) are not important practices which are adopted by firms. This may be explained by the information provided by some of the foreign firms in the survey. These firms have stated that they are not involving in contacting with the local government; their clients who have the necessary network will handle such issues. In addition, some of the foreign firms stated that raw information or “data dumps” from the local “antenna” have limited usefulness.

There are six practices under “Network” category that are not significantly adopted by the respondents. Foreign firms have weak political support either the local Chinese government (N6) or their home country’s government (N7). Foreign firms will not enlarge the number of partners (N17) and are not “a member of a consortium in China” (N8). Though entrepreneurs with more social contacts (Koller, 1988) and network ties (Singh 2000) are usually able to obtain more information and recognize more opportunities, foreign firms are cautious in developing new relationships in China.

“Collaborating with competitors to add value to its products/services” (N10) is not an important practice. One interviewee working in a Singapore-owned firm said:

“Even though there are potential advantages to be gained from alliances, such as cost sharing, risk reduction, and flexibility, negative effects may also result between

competitors. Imitation, value appropriation, and leakage of resources are some of the problems between competitors that can seriously affect a firm's performance."

Foreign firms in the survey believe that the practice of setting up networks proactively (N14) is significantly important while setting up networks contingently (N15) is unimportant. In the survey, proactive network is explained as the network established based on the consideration of the growth of the organization (Hite and Hesterly, 2001). On the other hand, a contingent network is explained as the network established voluntarily by the managers through their personal and social actions (Granovetter, 1992). The results show that the nature of foreign firms' networks is more calculated rather than identity-based (Hite and Hesterly, 2001).

In summary, after t-test, 44 practices were identified as important practices to achieve competitiveness. In the next section, exploratory factor analysis (EFA) was conducted on these 44 practices to identify the underlying structure of the PSN model. And confirmatory factor analysis (CFA) is conducted to identify critical strategies.

6.4 Critical strategies and important practices -- results of factor analysis

This section reports on the results of factor analysis conducted on 44 practices (see section 6.3) that are adopted to a significant extent by foreign firms. Firstly, EFA (see

section 5.7) was used to identify the underlying structures, which were named as “critical strategies” in this research. The EFA result is used to establish P (Porter)-S (Sun Tzu)-N (Network) model. Secondly, CFA (see section 5.7) was done to test the validity of the PSN model as a structure equation model (SEM) which can be analyzed by Partial Least Square (PLS) method (see section 5.6).

This section also reports the results of factor analysis on 7 attributes of competitive performance. This is to identify the dimensions underlying the competitive performance which were used to evaluate foreign firms’ (see section 6.4.2).

6.4.1 Identification of Critical strategies

This section examines the underlying structures of PSN model via EFA. The results of EFA on Porter’s strategy, Sun Tzu’s strategy and Network strategy are discussed in Section 6.4.1.1 to Section 6.4.1.3. Each of these sections includes the reliability test and exploratory factor analysis, which were conducted by using SPSS.

All measurement items under Porter’s strategy, Sun Tzu’s strategy and Network strategy were tested via Cronbach’s alpha coefficients, item -total correlation scores, reliability of linear combination scores and factor loadings (see section 5.7). The testing process sequence for each of these strategies is the same. Reliability test was done first to decide the candidate for the subsequent EFA. During EFA, those items

(practices) leading to unreliable results were eliminated from the factor scale. The reset EFA was done until the final clear and rigid underlying structures were constructed. Finally, the factor loadings from the EFA are included to provide the overall results of the underlying structures of the PSN model and achieve overall reliability of these underlying structures.

6.4.1.1 EFA of Porter's generic strategy

The t-test results in Table 6.2 show that 16 practices relating to Porter's generic strategy are adopted by foreign firms to a significant extent. These were subjected to factor analysis.

Three factor structures, labeled as FAC1, FAC2 and FAC3, were emerged from the EFA for Porter's strategies (see Table 6.3). The construction of Porter's underlying structure involved eliminating one item that may lead to an unreliable construct and two items that may have a negative influence on discriminate validity within the construct.

During the reliability testing process, practices/items with low Cronbach's alpha coefficients (<0.7) and low item-total correlation (<0.3) (following Nunnally, 1978) were removed from doing EFA. "Firm serves only a specific group of clients" (F3), did not pass the reliability test, because its item-total correlating of 0.271, is lower than

threshold level of 0.30.

During the EFA process, items exhibiting low factor loadings (<0.45) or showing high cross loadings (>0.45) (Hair et al., 1989 and Comerey, 1973) were candidates for elimination until a clean and rigid factor structure was obtained (see section 5.7.3.6). Accordingly, two more practices, “Firm invests in technology” (C3) and “Firm reduces costs in administrative activities” (C7) were eliminated from the scale because of their cross loadings on more than one factor. For C3, loadings on the two factors are respectively 0.593 and 0.495 respectively. For C7, the loadings on the two factors are 0.598 and 0.520 respectively. The decision to exclude an item that is cross loaded on more than one factor follows Hair et al (1989) and Comrey (1973) (see Section 5.6.3.6).

Table 6.3 EFA of Porter’s Generic Strategies

	Component Factors		
Practices for Porter’s Generic Strategy	**FAC1** Eigen=5.03 % of Variance=38.75	**FAC2** Eigen=2.08 % of Variance=15.99	**FAC3** Eigen=1.18 % of Variance=9.08
D4 Firm provides high quality outputs (products and services)	.858	.093	.188
D3Firm ensures the quality of inputs are high	.816	.038	.296
D1Firm offers product/service which has unique features	.801	.152	-.131
D2Firm includes superior design techniques or adopts superior construction technology or management in product delivery	.745	.193	.317
D6Firm offers comprehensive service to clients	.744	-.043	.193
D5Firm provides innovative product/ service	.601	.279	-.066
F4Firm offers a focused range of product/services	.068	.789	.032
C9-Firm’s staff undergo training regularly	.032	.733	.204
F2-Firm operates in a specific construction market segment	.309	.649	.342

Practices for Porter's Generic Strategy	Component Factors		
	FAC1 Eigen=5.03 % of Variance=38.75	**FAC2** Eigen=2.08 % of Variance=15.99	**FAC3** Eigen=1.18 % of Variance=9.08
C6Firm reduces costs in its operations	.294	-.059	.735
C2Firm establishes vertical linkages	.096	.187	.706
C5Firm reconfigures its value chain (eg. redesign, omit or refocus on some elements of the value chain)	.105	.249	.619
C1Firm learns continuously	.032	.303	.680

Extraction Method: Principal Component Analysis, Percentages of Variance shown are before rotation.
Rotation Method: Varimax with Kaiser Normalization, loadings in the table are after rotation.

The result of KMO test is 0.751 and Bartlett's test is significant at the 0.000 level. These results demonstrate the factorability of the data matrices (Hair et al., 1989). Three factors out of the 13 adopted practices were extracted through factor analysis with the cumulative percentage of variance up to 63.8% and an eigen value of 1.18. The percentages of variance explained by the factors FAC1, FAC2, and FAC3, are 38.75%, 15.99%, and 9.08% respectively.

It can be seen from Table 6.3 that all measurement items have loaded considerably (ranging from 0.601 to 0.858) on their corresponding factors. These good factor loadings contributed to a high convergent validity of individual measurement items within the three underlying structures of Porter's generic strategy. Table 6.4 shows the reliability of this three-structure result after removing of the inconsistent items. It shows that all measurement items did not cross-load on more than one factor, thus suggesting an adequate level of discriminate validity of the underlying structure.

Table 6.4 Results of data reliability tests for Porter's Generic Strategy

Underlying structures and practices Cronbach's alpha=0.856	Item-total correlation		Factor loadings
	Sub Scale	Whole scale	
FAC1 (Cronbach's alpha=0.871)			
D4- Firm provides high quality outputs	0.799	0.647	0.858
D3- Firm ensures the quality of inputs are high	0.751	0.629	0.816
D1- Firm offers product/service which has unique features	0.637	0.451	0.801
D2- Firm includes superior design techniques or adopts superior construction technology or management in product/service delivery	0.736	0.686	0.745
D6- Firm offers comprehensive services to clients	0.633	0.471	0.744
D5- Firm provides innovative product/services	0.548	0.540	0.601
FAC2 (Cronbach's alpha=0.716)			
F4- Firm offers a focused range of products/services	0.612	0.431	0.789
C9- Firm's staff undergoes training regularly	0.701	0.665	0.733
F2- Firm operates in a specific construction market segment	0.492	0.392	0.649
FAC3 (Cronbach's alpha=0.717)			
C6- Firm reduces costs in its operations	0.571	0.450	0.735
C2- Firm establishes vertical linkages	0.489	0.430	0.706
C5- Firm reconfigures its value chain	0.519.	0.531	0.619
C1- Firm learns continuously	0.574	0.505	0.680

Table 6.4 shows that the Cronbach's alpha coefficients of these three underlying structures have exceeded the threshold level of 0.7 (Nunnally, 1978) after the inconsistent measurement items were removed. The Cronbrach's alpha coefficients range from 0.716 to 0.871. The overall reliability is 0.856, referring to the reliability of linear combination of the underlying structures. The high values of both the Cronbrach's alpha coefficients of the underlying structures and the overall linear combination indicate that the high degree of internal reliability of the constructs and confidence reliability of the measurement obtained. The subscale and whole scale scores corresponding to all dimensions respectively range from 0.489 to 0.799 and 0.392 to 0.686 respectively. This shows the internal reliability of the individual

constructs.

6.4.1.2 Factors analysis of Sun Tzu's strategies

Factor analysis was undertaken on the 17 important practices relating to Sun Tzu's War strategy identified in Table 6.2. Three factor structures, labeled as FAC4, FAC5 and FAC6, were emerged from the EFA for Sun Tzu's strategies (see Table 6.5). The emergence of these underlying structures involved eliminating two items that are inappropriate for EFA.

All 17 measurement items under Sun Tzu's strategies have exceeded the threshold level of Cronbach's alpha coefficients (>0.7) and item-total correlation (>0.3) (Nunnally, 1978), suggesting reliability of the underlying structures based on these 17 practices. During the EFA process, two items, "Firm equips itself with good information analysis infrastructure" (MI5) and "Firm empowers general management to evaluate and execute changes" (A6) have exhibited high cross loadings (>0.45) (Comrey, 1973). As they have a negative influence, they were eliminated to obtain a clean and rigid factor structure. For MI5, the loadings on FAC4 and FAC5 are 0.625 and 0.589 respectively. The loadings of A6 on FAC4 and FAC5 are 0.572 and 0.469 respectively. After the trimming process, a three-factor solution was emerged from 15 adopted practices from Sun Tzu's War strategy. Table 6.5 shows the three factors that emerged in the EFA retest have met both the eigen values greater than 1 and the factor loading of each

practice larger than 0.45.

Table 6.5 EFA of Sun Tzu's War Strategies

Practices for Sun Tzu's War Strategy	Component Factors		
	FAC4 Eigen=8.17 % of Variance=54.49	**FAC5** Eigen=1.53 % of Variance=10.20	**FAC6** Eigen=1.03 % of Variance=6.83
MI3 Firm assesses risks comprehensively before embarking on a project in China	.808	.202	.030
A4 Firm offers options when faced with changes during implementation	.773	.227	.288
MI6 Firm accesses broad market information	.773	.296	.111
S1 Firm achieves fast delivery from suppliers	.726	.029	.381
A3Firm establishes organizational culture based on adaptability mechanism	.688	.204	.324
MI4 Firm equips itself with good information and communication infrastructure	.656	.329	.127
A7Firm has a post-change responsive system to pay compensation for losses arising from unexpected events	.645	.109	.335
S6 Firm collaborates actively	.622	.292	.312
S5 Firm innovates its service/product continuously	.146	.852	.141
S4 Firm takes actions to improve the speed of execution	.102	.772	.361
A2 Firm does innovative marketing for products in advance	.366	.731	.177
A1 Firm creates an adaptable organizational structure	.309	.671	.364
S3 Firm accommodates the client's incessant requests	.147	.380	.816
S2 Firm owns fast internal communication	.330	.201	.786
A5 Firm encourages employee participation in decision making	.319	.358	.680

Extraction Method: Principal Component Analysis, Percentages of Variance shown are before rotation.
Rotation Method: Varimax with Kaiser Normalization, loadings in the table are after rotation.

The result of KMO test is 0.868 and Bartlett's test is significant at the 0.000 level, demonstrating the factorability of the data matrices (Hair et al., 1989). Three factors, labeled as FAC4, FAC5 and FAC6, out of 15 adopted practices were extracted through factor analysis with the cumulative percentage variance of 71.52%. As shown in Table 6.5, FAC4 was first identified with an eigen value of 8.17, representing 54.49% of the explained variance. Subsequently, FAC5 was extracted with and eigen value of 1.53,

and accounts for 10.20% of the explained variance. The last factor is FAC6 with an eigen value of 1.03.

It can be seen from Table 6.5 that the convergent validity of individual measurement items within the three underlying structures of Sun Tzu's strategy is high since the factor loadings of measurement items range from 0.622 to 0.852 (Hair et al., 1989 and Comrey, 1973). In addition, the results in Table 6.5 show that all measurement items load only on one single factor, which means discriminate validity of the underlying structure is high.

The reliability of this three-structure result after removing inconsistent items (MI5 and A6) is shown in Table 6.6.

Table 6.6 Results of data reliability for Sun Tzu's War Strategy

Underlying structures and practices Cronbach's alpha=0.939	Item-total correlation		Factor loadings
	Subscale	Whole scale	
FAC4 (Cronbach's alpha=0.917)			
MI3 Firm assesses risks comprehensively before embarking on a project in China	.699	.629	.808
A4 Firm offers options when faced with changes during implementation	.807	.757	.773
MI6 Firm accesses broad market information	.755	.705	.773
S1 Firm's suppliers provide fast delivery	.710	.656	.726
A3Firm establishes organizational culture based on adaptability mechanism	.753	.749	.688
MI4 Firm equips itself with good information and communication infrastructure	.738	.758	.656
A7Firm has a post-change responsive system to pay compensation for losses arising from unexpected events	.621	.612	.645
S6 Firm collaborates actively	.729	.754	.622
FAC5 (Cronbach's alpha=0.867)			
S5 Firm innovates its service/product continuously	.726	.567	.852
S4 Firm takes actions to improve the speed of execution	.700	.612	.772
A2 Firm does innovative marketing for products in advance	.693	.763	.731
A1 Firm creates an adaptable organizational structure	.776	.707	.671
FAC6 (Cronbach's alpha=0.863)			

Underlying structures and practices Cronbach's alpha=0.939	Item-total correlation		Factor loadings
	Subscale	Whole scale	
S3 Firm accommodates the client's incessant requests	.747	.646	.816
S2 Firm owns fast internal communication	.712	.670	.786
A5 Firm encourages employee participation in decision making	.771	.773	.680

Table 6.6 shows that the Cronbach's alpha coefficients of these three underlying structures have exceed the threshold level of 0.7 (Nunnally, 1978) after the inconsistent measurement items removed. The Cronbrach's alpha coefficients of FAC4, FAC5 and FAC6 are 0.917, 0.867 and 0.863 respectively. The overall reliability score of 0.939 suggests there is reliable of linear combination of the underlying structures. The high values of both the Cronbrach's alpha coefficients of the underlying structures and the overall linear combination indicate that the high degree of internal reliability of the constructs and confidence reliability of the measurement obtained. The subscale and whole scale scores corresponding to all dimensions range from 0.621 to 0.807 and 0.567 to 0.773 respectively. This shows the internal reliability in individual constructs.

6.4.1.3 Factors analysis of Network strategy

EFA was conducted on 11 important network practices identified in Table 6.2. Using the same process, two factors, labeled as FAC7 and FAC8, emerged from the EFA for Network strategy. Table 6.7 shows the two factors that have been extracted in the EFA retest following the removal of the two items. "Firm engages in multi-level partnering"

(N5) and “Firm obtains resources from other firms on network” (N12) were removed because of low item-total correlations obtained, 0.273 and 0.175 respectively, which are less than 0.30. This means they have negative influence on the linear combination of underlying structures.

Table 6.7 EFA of Network Strategy

Practices for Network Strategy	Component Factors	
	FAC7 Eigen=4.77 %of Variance=53.00	**FAC8** Eigen=1.21 %of Variance=13.42
N11-Firm encourages information communication across hierarchies	.868	.202
N1-Firm establishes mutual trust among other firms in its network	.845	.308
N3-Firm resolves conflicts efficiently	.837	.094
N2-Firm has long-term commitment with other firms in the network	.776	.339
N16-Firm sets up compatible goals with partners	.707	.301
N4-Firm seeks mutually supportive actions with other firms in its network	.262	.809
N14-Firm sets up network proactively	.104	.783
N13-Firm establishes routes to share knowledge with other firms in its network	.227	.692
N9-Firm partners with local PRC firms	.340	.534

Extraction Method: Principal Component Analysis, Percentages of Variance shown are before rotation.
Rotation Method: Varimax with Kaiser Normalization, loadings in the table are after rotation.

The result of KMO test was 0.788 and Bartlett’s test was significant at the 0.000 level. These results demonstrate the factorability of the data matrices (Hair et al., 1989). Two factors, labeled as FAC7and FAC8, out of nine important network practices were extracted through factor analysis with the cumulative variance of 66.43%. Table 6.7 shows that FAC7 was first identified with an eigen value of 4.77, representing 53.00% of the explained variance. Subsequently, FAC8 was extracted with and eigen value of 1.21, and accounts for 13.42% of the explained variance. Table 6.7 shows that all

measurement items of FAC7 and FAC8 have loaded considerably on their corresponding factors, ranging from 0.534 to 0.868. This indicates a high level of convergent validity, and establishes the uni-dimensionality of individual underlying structures. In addition, Table 6.8 shows that all measurement items did not cross-load excessively (all cross loadings<0.45) on more than one factors, and thus suggesting an adequate level of discriminate validity of the underlying structures.

The reliability of this two-structure result is shown in Table 6.8. It can be seen that the Cronbach's alpha coefficients of these two underlying structures have exceeded the threshold level of 0.7 (Nunnally, 1978) after the inconsistent measurement items were removed. The Cronbrach's alpha coefficients For FAC7 and FAC8 are 0.901 and 0.740 respectively. The overall reliability score is 0.885. The high values of both the Cronbrach's alpha coefficients of the underlying structures and the overall linear combination indicate that the high degree of internal reliability of the constructs and confidence reliability of the measurements obtained. The subscale and whole scale scores corresponding to all dimensions range from 0.455 to 0.847 and 0.451to 0.747 respectively. This shows the internal reliability in the individual constructs.

Table 6.8 Results of data reliability for Network Strategy

Underlying structures and practices Cronbach's alpha=0.885	**Item-total correlation**		**Factor loadings**
	Subscale	**Whole scale**	
FAC7 (Cronbach's alpha=0.901)			
N11-Firm encourages information communication across hierarchies	.806	.747	.868
N1-Firm establishes mutual trust among other firms in its network	.847	.801	.845
N3-Firm resolves conflicts efficiently	.714	.638	.837
N2-Firm has long-term commitment with other firms in the network	.753	.756	.776

Underlying structures and practices Cronbach's alpha=0.885	Item-total correlation		Factor loadings
	Subscale	Whole scale	
N16-Firm sets up compatible goals with partners	.657	.661	.707
FAC8 (Cronbach's alpha=0.740)			
N4-Firm seeks mutually supportive actions with other firms in its network	.704	.606	.809
N14-Firm sets up network proactively	.530	.451	.783
N13-Firm establishes routes to share knowledge with other firms in its network	.455	.492	.692
N9-Firm partners with local PRC firms	.485	.581	.534

6.4.2 Dimensions of competitive performance

Before identifying the dimensions of competitive performance, t-test of the mean was calculated to find out if the firms are significantly competitive in various aspects (P1 to P7). The hypotheses are set up below:

H_0: μ is <4.

H_1: μ is ≥ 4.

"4" is chosen because on a 7-point scale, "4" is the mean score. The null hypothesis is that the firm was "not-competitive". When the t-statistic is larger than -1.63, it was then concluded that the firm is not uncompetitive, i.e. is more competitive than or as competitive as its competitors. Table 6.2 shows that all the t-statistic for P1 to P7 were larger than -1.63. This suggests that the respondents are not uncompetitive in the seven aspects (P1 to P7).

Two factor structures, labeled as Y1 and Y2, emerged from the EFA for competitive

performance (see Table 6.9). During the reliability testing process, one attribute “Firm is competitive in delivering project ahead of schedule” (P7) was removed because of its low item-total correlation (0.271), which is less than threshold level of 0.30.

Table 6.9 EFA of Competitive Performance

Attributes for Competitive Performance	Component Factors	
	Y1 Eigen=3.42 % of Variance=56.94	**Y2** Eigen=1.15 % of Variance=19.21
P1-Firm is competitive in winning large number of projects	0.899	0.106
P3-Firm is profitable	0.898	0.195
P2-Firm is competitive in winning large value of projects	0.805	0.394
P6-Firm is competitive in achieve good public image	0.253	0.870
P5-Firm is competitive in achieving client satisfaction	0.270	0.756
P4-Firm’s products/service quality is competitive	0.076	0.754

Extraction Method: Principal Component Analysis, Percentages of Variance shown are before rotation.
Rotation Method: Varimax with Kaiser Normalization, loadings in the table are after rotation.

Table6.10 Results of data reliability for Competitive Performance

Underlying structures and practices Cronbach’s alpha=0.849	**Item-total correlation**		**Factor loadings**
	Subscale	Whole scale	
Y1 (Cronbach’s alpha=0.890)			
P1-Firm is competitive in winning large number of projects	.748	.624	.899
P2-Firm is competitive in winning large value of projects	.804	.849	.805
P3-Firm is profitable	.809	.692	.898
Y2 (Cronbach’s alpha=0.764)			
P4-Firm’s products/service quality is competitive	.469	.424	.754
P5-Firm is competitive in achieving client satisfaction	.606	.568	.756
P6-Firm is competitive in achieve good public image	.754	.632	.870

The result of KMO test was 0.758 and Bartlett’s test was significant at the p=0.000 level. These results demonstrate the factorability of the data matrices (Hair et al., 1989). Two factors, labeled as Y1 and Y2, out of six important performance attributes were extracted through factor analysis with the cumulative variance of 76.15%. Table 6.9 shows that Y1 was first identified with an eigen value of 3.42, representing 56.94% of

the explained variance. Subsequently, Y2 was extracted with an eigen value of 1.15, and accounts for 19.21% of the explained variance. Table 6.9 shows that all measurement items of Y1 and Y2 have loaded considerably on their corresponding factors, ranging from 0.754 to 0.899. This indicates a high level of convergent validity, and establishes the uni-dimensionality of individual underlying structures. In addition, Table 6.10 shows that all measurement items did not cross-load excessively (all cross loadings<0.45) on more than one factors, and thus suggesting an adequate level of discriminate validity of the underlying structures.

The reliability of this two-structure result is shown in Table 6.10. It can be seen that the Cronbach's alpha coefficients of these two underlying structures have exceeded the threshold level of 0.7 (Nunnally, 1978) after the inconsistent measurement item was removed. The Cronbrach's alpha coefficients for Y1 and Y2 are 0.890 and 0.764 respectively. The overall reliability score is 0.849. The high values of both the Cronbrach's alpha coefficients of the underlying structures and the overall linear combination indicate that the high degree of internal reliability of the constructs and confidence reliability of the measurements obtained. The subscale and whole scale scores corresponding to all dimensions range from 0.469 to 0.809 and 0.424 to 0.849 respectively. This shows the internal reliability in the individual constructs.

Table 6.9 shows that performance attributes P1, P2 and P3 which are highly loaded on

Y1 are generally quantitative measures. They cover the number and value of projects won in China, as well as the profitability of the foreign firms. Y1 is thus named as Quantitative Performance. The other three performance attributes P4, P5 and P6 describe foreign firm's performance in qualitative dimension. Since these three measurements bring higher factor loadings on Y2, it is named as Qualitative Performance.

6.4.3 Confirmatory factor analysis results

Unlike the discover-oriented nature of EFA, confirmatory factor analysis (CFA) focuses on the theoretical specification, i.e., the prescribed relations between constructs as well as the discovered relations between measurement items and individual constructs (see section 5.7). In this research, CFA is conducted via Smart PLS software to test the statistically significance of individual construct, and the internal validity of the constructs in PSN model and the discriminate validity of constructs in the PSN model. It should be noted that the process of CFA is not only to provide evidence that the PSN model established in EFA is both theoretical and empirical, but also to meet the prerequisites for PLS operation, which is done after CFA to achieve the relationships between strategies and competitive performance. CFA of the PSN model is tested by factors loadings and t-statistics of individual measurement items, composite reliability scores, and average variance extracted values (AVE) and cross loading matrices.

The results of CFA for the PSN model are shown in Table 6.11. The t-statistics of individual measurement items are used to test the statistical significance of the factor loadings. The null hypothesis is that each factor loading (the parameter estimates in CFA) in the PSN model is not significant different from 0. When the null hypothesis is rejected, it is concluded that the items/practices significantly related to its corresponding construct and should be retained in the models. As noted in Table 6.11, factor loadings for all items of respective items are above 0.45, ranging from 0.665 to 0.933. At the same time, the t-statistics of all items are greater than 1.68, which means that all factor loadings have 95% confidence level. For CFA, statistically significant high loadings of measurement items contribute to the convergent validity within each constructs.

Table 6.11 Results of CFA

Underlying structures and practices	Factor Loadings	t-statistic	Composite reliability	AVE
FAC1 Differentiation			0.8853	0.6089
D1- Firm offers product/service which has unique features	0.7413	8.5217		
D2- Firm includes superior design techniques or adopts superior construction technology or management in product/service delivery	0.8378	9.2222		
D3- Firm ensures the quality of inputs are high	0.8623	28.9847		
D4- Firm provides high quality outputs	0.8913	27.7264		
D5- Firm provides innovative product/services	0.6653	5.3342		
D6- Firm offers comprehensive services to clients	0.7792	11.5195		
FAC2 Focus-training			0.8189	0.5348
C9- Firm's staff undergoes training regularly	0.9202	5.7299		
F2- Firm operates in a specific construction market segment	0.6323	2.5706		
F4- Firm offers a focused range of products/services	0.7573	3.6188		
FAC3 Cost leadership			0.8209	0.6067
C2- Firm establishes vertical linkages	0.7523	6.2242		
C5- Firm reconfigures its value chain	0.7879	6.467		

Underlying structures and practices	Factor Loadings	t-statistic	Composite reliability	AVE
C6- Firm reduces costs in its operations	0.6834	4.6618		
C1- Firm learns continuously	0.6967	4.4583		
FAC4 Risk responsiveness			0.9326	0.6451
S1 Firm achieves fast delivery from suppliers	0.8037	13.3699		
S6 Firm collaborates actively	0.8116	11.0706		
A3Firm establishes organizational culture based on adaptability mechanism	0.8149	14.4718		
A4 Firm offers options when faced with changes during implementation	0.8497	16.0522		
A7Firm has a post-change responsive system to pay compensation for losses arising from unexpected events	0.6806	4.3907		
MI3 Firm assesses risks comprehensively before embarking on a project in China	0.7666	8.8237		
MI4 Firm equips itself with good information and communication infrastructure	0.8056	13.1149		
MI6 Firm accesses broad market information	0.8264	10.9234		
FAC5 Market-oriented swiftness			0.9104	0.7179
S4 Firm takes actions to improve the speed of execution	0.8069	8.8388		
S5 Firm innovates its service/product continuously	0.8271	8.6483		
A1 Firm creates an adaptable organizational structure	0.8618	23.0894		
A2 Firm does innovative marketing for products in advance	0.8908	19.7657		
FAC6 Client-oriented swiftness			0.917	0.7865
S3 Firm accommodates the client's incessant requests	0.8899	22.9979		
S2 Firm owns fast internal communication	0.8704	12.6073		
A5 Firm encourages employee participation in decision making	0.9001	18.7079		
FAC7 Trust network			0.9272	0.7187
N1-Firm establishes mutual trust among other firms in its network	0.9015	18.0949		
N2-Firm has long-term commitment with other firms in the network	0.8483	14.1921		
N3-Firm resolves conflicts efficiently	0.8193	9.5494		
N11-Firm encourages information communication across hierarchies	0.8859	19.9003		
N16-Firm sets up compatible goals with partners	0.7777	13.2552		
FAC8 Resource network			0.8393	0.5694
N4-Firm seeks mutually supportive actions with other firms in its network	0.8876	9.0773		
N9-Firm partners with local PRC firms	0.7450	4.5761		
N13-Firm establishes routes to share knowledge with other firms in its network	0.7016	4.2637		
N14-Firm sets up network proactively	0.6652	3.7934		
Y1 Quantitative performance			0.9296	0.8152
P1-Firm is competitive in winning large number of projects	0.8452	11.152		

Underlying structures and practices	Factor Loadings	t-statistic	Composite reliability	AVE
P2-Firm is competitive in winning large value of projects	0.9328	37.4293		
P3-Firm is profitable	0.9281	37.587		
Y2 Qualitative performance			0.8643	0.6808
P4-Firm's products/services quality is competitive	0.7623	10.2024		
P5-Firm is competitive in achieving client satisfaction	0.8074	8.6435		
P6-Firm is competitive in achieving good public image	0.8998	25.5929		

Composite reliability is used to assess the internal reliability of the PSN model set up in CFA. From Table 6.11, it can be seen that composite reliability scores of the constructs achieved from PLS range from 0.819 to 0.933, exceeding threshold level of 0.70, which suggests the reliabilities of internal measurement items within each construct.

The use of AVE will provide two sets of evidences in CFA. Firstly, the convergent validities of individual constructs will be confirmed when AVE values are above 0.50 (Fornell and Larcker, 1981). Table 6.11 shows that AVE values of all the constructs range from 0.535 to 0.815, which means the bulk of measurement variance is captured by the constructs demonstrating a satisfactory level of convergent validity.

Secondly, AVE values will be used to show the discriminate validity of the constructs established in EFA. To achieve good discriminate validity, the square root of AVE of all the constructs should be greater than the correlation between any pair of constructs in the model. This is also supported by the results shown in Table 6.12. In addition,

among the cross loading matrices generated by PLS (see Table 6.13), all items loaded higher on their corresponding constructs obtained in EFA. The cross loading analysis re-confirms the factor structure that emerged from EFA.

Table 6.12 Correlation matrix and square root of AVE of constructs

	FAC1	FAC2	FAC3	FAC4	FAC5	FAC6	FAC7	FAC8	Y1	Y2
FAC1	**0.780**	0	0	0	0	0	0	0	0	0
FAC2	0.400	**0.731**	0	0	0	0	0	0	0	0
FAC3	0.419	0.578	**0.779**	0	0	0	0	0	0	0
FAC4	0.706	0.469	0.462	**0.803**	0	0	0	0	0	0
FAC5	0.667	0.500	0.633	0.653	**0.847**	0	0	0	0	0
FAC6	0.579	0.668	0.605	0.673	0.667	**0.887**	0	0	0	0
FAC7	0.620	0.554	0.577	0.787	0.604	0.759	**0.848**	0	0	0
FAC8	0.511	0.510	0.536	0.664	0.654	0.523	0.604	**0.755**	0	0
Y1	0.424	0.531	0.316	0.411	0.489	0.423	0.356	0.229	**0.903**	0
Y2	0.660	0.480	0.322	0.637	0.508	0.401	0.468	0.495	0.523	**0.825**

Note: Bold numbers are square root of AVE.

Table 6.13 Cross loadings for individual measurement items

Items	FAC1	FAC2	FAC3	FAC4	FAC5	FAC6	FAC7	FAC8	Y1	Y2
D1	**0.741**	0.241	0.120	0.574	0.44	0.189	0.469	0.484	0.192	0.627
D2	**0.838**	0.368	0.478	0.680	0.477	0.52	0.625	0.480	0.271	0.622
D3	**0.862**	0.330	0.409	0.522	0.609	0.555	0.495	0.338	0.422	0.747
D4	**0.812**	0.279	0.383	0.490	0.485	0.375	0.461	0.484	0.347	0.408
D5	**0.665**	0.438	0.262	0.473	0.657	0.406	0.433	0.455	0.453	0.312
D6	**0.779**	0.299	0.257	0.519	0.451	0.561	0.404	0.291	0.333	0.571
C9	0.454	**0.920**	0.554	0.558	0.679	0.630	0.676	0.591	0.322	0.362
F2	0.182	**0.632**	0.299	0.180	0.267	0.143	0.197	0.347	0.000	0.129
F4	0.230	**0.757**	0.420	0.161	0.361	0.411	0.247	0.238	0.249	0.157
C2	0.251	0.356	**0.752**	0.343	0.324	0.426	0.425	0.457	0.397	0.394
C5	0.304	0.564	**0.788**	0.341	0.455	0.551	0.438	0.416	0.540	0.368
C6	0.373	0.303	**0.683**	0.389	0.269	0.463	0.397	0.184	0.288	0.399
C1	0.230	0.469	**0.697**	0.295	0.445	0.557	0.335	0.467	0.207	0.162
S1	0.586	0.287	0.383	**0.804**	0.406	0.545	0.641	0.416	0.487	0.589
S6	0.588	0.536	0.415	**0.812**	0.607	0.605	0.592	0.598	0.328	0.555
A3	0.606	0.406	0.433	**0.815**	0.526	0.647	0.702	0.485	0.262	0.521
A4	0.625	0.359	0.445	**0.850**	0.527	0.570	0.671	0.543	0.25	0.500
A7	0.435	0.258	0.283	**0.681**	0.439	0.515	0.586	0.514	0.101	0.382
MI3	0.566	0.191	0.211	**0.767**	0.465	0.405	0.571	0.525	0.287	0.505
MI4	0.578	0.548	0.399	**0.806**	0.669	0.536	0.615	0.674	0.307	0.531

Items	FAC1	FAC2	FAC3	FAC4	FAC5	FAC6	FAC7	FAC8	Y1	Y2
MI6	0.490	0.333	0.399	**0.826**	0.531	0.479	0.707	0.512	0.473	0.430
S4	0.577	0.602	0.450	0.444	**0.807**	0.590	0.521	0.562	0.174	0.355
S5	0.577	0.443	0.352	0.457	**0.827**	0.472	0.409	0.503	0.450	0.359
A1	0.517	0.615	0.507	0.595	**0.862**	0.632	0.498	0.514	0.548	0.457
A2	0.612	0.507	0.391	0.670	**0.891**	0.573	0.625	0.653	0.386	0.520
S3	0.492	0.470	0.663	0.512	0.622	**0.890**	0.525	0.373	0.378	0.363
S2	0.559	0.592	0.622	0.600	0.519	**0.870**	0.779	0.492	0.348	0.377
A5	0.490	0.548	0.493	0.682	0.634	**0.900**	0.721	0.529	0.400	0.329
N1	0.536	0.378	0.446	0.649	0.488	0.621	**0.902**	0.553	0.283	0.339
N2	0.437	0.450	0.327	0.707	0.393	0.547	**0.848**	0.575	0.310	0.430
N3	0.471	0.457	0.531	0.609	0.511	0.655	**0.819**	0.410	0.281	0.394
N11	0.712	0.560	0.515	0.728	0.632	0.772	**0.886**	0.517	0.278	0.472
N16	0.456	0.584	0.535	0.667	0.529	0.613	**0.778**	0.503	0.358	0.331
N4	0.492	0.555	0.347	0.559	0.648	0.372	0.473	**0.888**	0.203	0.410
N9	0.372	0.322	0.586	0.574	0.431	0.556	0.532	**0.745**	0.272	0.391
N13	0.440	0.451	0.253	0.445	0.593	0.324	0.434	**0.702**	0.128	0.399
N14	0.138	0.224	0.320	0.380	0.181	0.273	0.348	**0.665**	0.013	0.253
P1	0.250	0.129	0.314	0.270	0.304	0.386	0.276	0.093	**0.845**	0.320
P3	0.320	0.360	0.530	0.343	0.469	0.353	0.303	0.200	**0.928**	0.421
P2	0.528	0.314	0.539	0.466	0.508	0.415	0.373	0.286	**0.933**	0.621
P6	0.596	0.236	0.396	0.491	0.368	0.291	0.316	0.347	0.501	**0.900**
P5	0.411	0.283	0.417	0.618	0.392	0.320	0.370	0.380	0.465	**0.762**
P4	0.412	0.294	0.335	0.509	0.501	0.358	0.479	0.515	0.325	**0.807**

6.4.4 Interpretation and discussion of findings of critical strategies underlying PSN and practices to achieve critical strategies

After EFA and CFA, eight structures underlying the PSN model are identified. Porter's generic strategy, Sun Tzu's strategy and Network strategy, respectively, are supported by three, three and two critical strategies respectivley.

6.4.4.1 FAC1, FAC2 and FAC3 supporting Porter's generic strategy

As shown in Table 6.3, three separate factors are established from 13 practices within Porter's generic strategy (Porter, 1980), after three inconsistent items were removed.

FAC1-Differentiation

According to FAC1, all the original six practices under Porter's differentiation (**D**) strategy have relatively larger factor loadings on them compared to the other items. Following the factor analysis theory (Jae-On and Mueller, 1985a) that the items with higher factor loadings (absolute value) on a particular factor can be identified to interpret the meaning of this factor, FAC1 is named as "Differentiation".

Among these six practices, the first two practices emphasizing "high quality of the product" (D4 and D3) are predominant. This is consistent with Tillery and Rutledge (1991) who found that a reputation for "quality" is important for a firm to secure a good market position. The next four practices (D1, D2, D6 and D5) refer to the unique characteristic of product and service. This implies that customers may have special perceptions of foreign firms being able to provide innovative products and services. The reputation of using superior techniques and technologies ensure that new customers will be attracted and the demands of existing customers for unique features will be met (Atkin and Pothecary, 1994).

FAC2 Focus-Training

Three practices with relatively larger factor loadings on FAC2 come from focus (**F**) strategy and cost leadership (**C**) strategy. FAC2 is named of “focus-Training”. FAC2 emphasizes on training while at the same time meeting the needs of niche market.

By focusing on specific market segments (F2) that are large enough to have good growth potential, foreign firms could avoid operating in the key battlefield to other major competitors. This is consistent with Fred’s (2000) statement that focus strategies are most effective when consumers have distinctive preferences and when the niche has not been pursued by rival firms. Capitalizing on the knowledge and experience gained from managing other international projects, foreign firms should be able to identify and improve their performance in certain kinds of projects by offering a focused range of products/services (F4). This is consistent with Ling et al. (2005) who found that it is very important for foreign consultancy firms to offer niche/speciality products or services in the Chinese construction market. These niche/speciality products include one-stop services covering entire value chain, strong core competence rather than general competence, new ideas and management superiority.

In order to effectively perform well in a niche market, where customers have distinctive preferences, these firms must provide extensive training for their front-line personnel (C9). This practice is also emphasized by Ling et al. (2005) who further identified the

importance of training in delivering excellent services, enhancing client experience and expectation, understanding client culture, and how to establishing mutual respect and sincerity between employees and clients.

FAC3-Cost Leadership

Four items from Porter's cost leadership (**C**) have relatively larger factor loadings on FAC3. These four items are reducing costs in a firm's operations (C6), establishing vertical linkages (C2), continuous learning (C1), and reconfiguring it value chain (C5).

C6 is found to be driven by the relevancy of operational and administrative efficiency emphasizing the overarching cost objective. This is due to the fact that a tight control of the overhead costs reduces the administrative costs and operating costs involved in the whole process of production (Ling, 2003). Vertical linkages with other firms (C2) maximize long-term corporate wealth (Xu et al., 2004) as well as reduce project cost by using the cheaper resources involved in the linkage (Hammond, 1984). Foreign firms also redesign, omit or refocus on some elements of the value chain (C5), since they can prune or replace high-cost activities so as to achieve lower cost.

According to the factor analysis theory (Kim, 1978), the first factor explains the largest part of the total variance of cases. This suggests that "FAC1-Differention"- servicing uniqueness of a product or service and attempting to make the product or service

special in the mind of the customer-is different from other two critical strategies.

6.4.4.2 FAC4, FAC5 and FAC6 supporting Sun Tzu's strategy

As shown in Table 6.5, 15 practices within Sun Tzu's war strategy are categorized into three separate factors after two inconsistent items were removed. The practices constituting FAC4, FAC5 and FAC6 are the mixes of certain items under the original "Swiftness", "Adaptability", and "Market Intelligence" strategy. The results indicate that foreign firms are searching for an efficiently response to risks, proactively responding to markets, and quickly responding to clients. These three critical strategies are labeled "FAC4 risk responsiveness", "FAC5 market-oriented swiftness" and "FAC6 client-oriented swiftness".

FAC4-Risk responsiveness

FAC4 is labeled "risk responsiveness" as the practices relate to risk assessment. Table 6.6 shows that eight variables, comprising two Swiftness (S)-related items, three Adaptability (A)-related items and three Market Intelligence (MI)-related items, have larger factor loadings on FAC4. FAC4 shows strong correlations with certain practices which come under the original Swiftness (S), Adaptability (A) and Market Intelligence (MI) strategies.

Among these eight variables, "assesses risks comprehensively before embarking on a

project in China" (MI3) has the highest factor loading on FAC4. This means that understanding the opportunities and threats faced by a firm through detecting, simulating and identifying those current and potential trends and events is a predominant practice. Caution is advocated by researchers (Luo and Park, 2001; and Zou et.al., 2007), considering how complex, dynamic and informal the Chinese market can be.

Foreign firms also offers options when faced with changes that occur during project implementation (A4), as shown by A4's second highest factor loading on FAC4. Foreign firms need to be sensitive towards changes and adopt adequate response to reduce uncertainty. This may be achieved by collecting and updating superior market information (MI6). This is consistent with previous studies that broad, empirical, and updated information from multi-disciplines and multi-levels can help firms to better understand problems and come up with potential solutions (Johansson et al., 1993; Naim and Barlow, 2003).

Besides advocating caution in the Chinese construction market, FAC4 also suggests that firms be adaptable to these local situations inboth internal and external activities. Externally, firms should ensure that they have fast supports from suppliers (S1) as well as collaborate actively with other firms (S6). At the same time, infrastructures to improve internal communications (MI4) are suggested. These help firms to achieve

integration, collaboration, and process improvement (Sarshar and Isikdag 2004) so that they will be greater adaptability of product/service to fit changing and changed requirements. From an organizational culture perspective, high loadings from “adaptability culture” (A3) and “compensation system” for losses arising from unexpected events on FAC4 suggest that firms that deliberately put in place adaptability mechanism to minimize employees’ possible feelings of insecurity, when there is change. Employee’s rigidity and resistance to change, which may result in serious consequences, is thus reduced (Williams et al., 1989).

The components of FAC4 show that foreign firm realized that it is important to be both prudent and adaptive to respond to changes efficiently. “Risk-responsiveness” tends to minimize the adverse effects resulting from environmental uncertainty and complexity (IRM 2002), and help foreign firms to adjust and adapt to local situation. Foreign firms appear to be prudently assessing risks comprehensively, accessing broad information about the market, and considering changes in implementing plans. More than just being cautious, foreign firms response to the changes by being adaptive in the areas of infrastructure, human resource, and organizational culture.

FAC5-Market-oriented swiftness

The loadings of “Firm innovates its service/product continuously” (S5), “Firm creates an adaptable organizational structure” (A1), “Firm takes actions to improve the speed

of execution" (S4), and "Firm do innovative marketing for products in advance" (A2) on FAC5 are the highest among the factor loadings of all items. The component structure of FAC5 is more market-focused, since the practices include continuously innovating new products/services, which requires a search for new and multiple ways to compete and continuous develop new markets (Rajagopalan and Datta, 1996).

The important of continuous innovation (S5) lies in its unpredictable "new things" which will not be over taken by competitors. Introducing new design, technology, material component or construction methods to a project (Asad et al., 2005) will bring additional benefits. This is especially important in an environment where change is almost inevitable (Camero and Quinn, 1999). Innovative products (S5), and innovating marketing of products (A2) are necessary proactive approaches that enable early recognition of the need to change. To adapt to an uncertain environment, researchers propose an adaptable organizational structure (A1) featuring decentralization (Galbraith and Kazanjian, 1986), less interdependence among the different product-markets (Ramaswami et al., 1992), and an organic form of structure which is characterized by non-formalized roles that allow a great deal of lateral communication (Miller, 1986).

To reduce the risks that accompany the process of identifying new opportunities and meeting with new trends by offering innovative products and services, foreign firms

would improve the speed of execution (S4). This is important because when products/services are completed / delivered quickly, foreign firms would gain first mover advantage as the first to see opportunities in developing markets (Anderson & Engers, 1994) or as the first to enter the markets (Luo & Peng, 1998). Besides responding to changes after prudent analysis of the environment, foreign firms may also choose to adopt more proactive market strategies. This is indicated by the second factor extracted from Sun Tzu's strategy which focuses on being proactive to changes, especially those of market needs. Firms proactively plan their approaches to fit the uncertainty and the changing requirements. The continuous innovation of product/ service allows foreign firms to remain competitive, have market responsiveness and achieve product differentiation.

FAC6 Clients-oriented swiftness

Three practices with relatively larger loadings on FAC6 are "accommodating the client's incessant requests" (S3), "fastening internal communication" (S2), and "encouraging employee participation in decision making". Constructed from these three practices, FAC6 represents a client-oriented swiftness nature.

In project execution, the client's changing requirements is the main source of time delay. After contributing to the delay, clients may then request that the project be accelerated (S3). To ensure client satisfaction, especially for those firms which are

adopting “following clients” as an entrance strategy into the Chinese construction market, foreign firms would accede to the request. This is also to preserve the relationship with their clients, and thus ensuring a continuous flow of projects from clients who have business globally. This is supported by Ling et al., (2005) who suggested consultancy firms should try to form alliances with home country clients to enter China together, since entering China with clients can reduce developmental costs, lessen risks and achieve faster payments.

Foreign firms may be motivated to further improve their efficiency. Foreign firms emphasize the important role of internal communication (S2) which is the channel for foreign firms to apply the product/service developed by their headquarters, and to transfer project-specific requirement to their firms’ R&D department. To facilitate effective decision making, the perceptions and suggestions of employees, especially the professionals are seriously considered in decision making. The finding is consistent with Ling et al. (2005) who found that with good internal communication, foreign subsidiaries in China can receive the support from headquarters or other subsidiaries in the delivery of projects, especially those with specific and high technological requirements. During the communication between branch and headquarters, employees’ knowledge of the territory and what is achievable and not achievable are so important that they contribute a lot to quick decision making.

6.4.4.3 FAC7 and FAC8 supporting Network's strategy

Network strategy is supported by two underlying structures, comprising nine practices. This is the results after two inconsistent items were removed. Based on the practices of each factor, FAC7 and FAC8 are named as trust-factor and resource-factor respectively.

FAC7 Trust-network

Five practices have higher loadings on FAC7. The one with the highest factor loading is "Firm encourages information communication" (N11). This suggests that trust is realized through facilitating communication among participants (Tang et al., 2006). The emphasis on trust that is embedded in a network is consistent with other studies which found that partnering creates a trust-based environment, which encourages project participants to ensure the success of the project to the benefit of all (Cowan, 1991; and Scott 2001).Trust is the starting point to set up a relationship (Kadefors, 2004), as well as a critical factor in ensuring the success and continuity of that relationship (Cheng and Li, 2002). During the gradual establishment of trust, compatible goals among partners (N16) long term commitment among firms (N2) and resolving conflicts actively (N3) are important (Scott, 2001and Cheng and Li, 2002).

FAC8 Resource-network

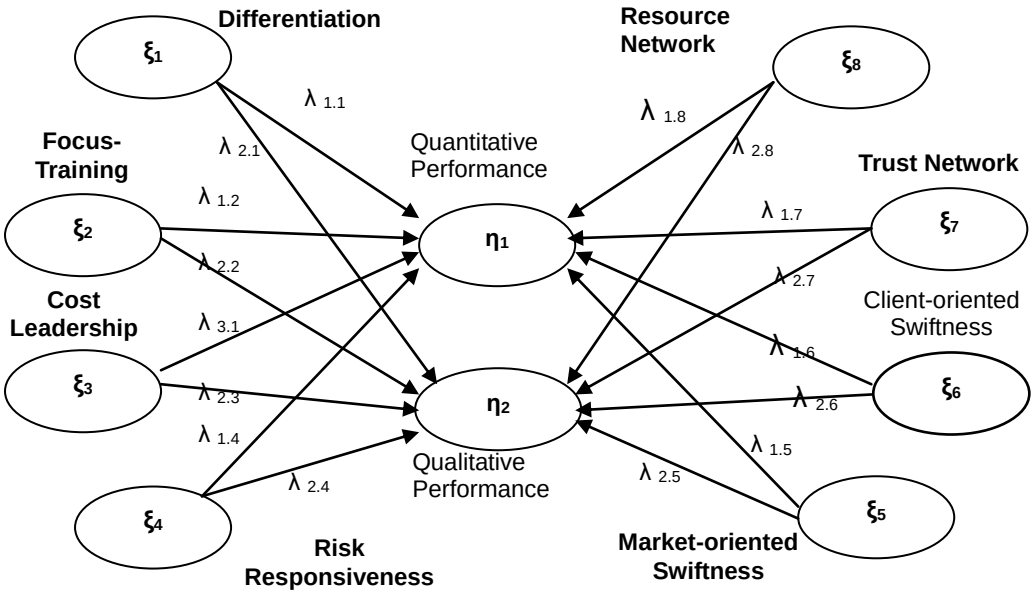
“Seeking mutually supports from other firms in network (N4)” has the highest factor loading on FAC8, which shows that the focus of FAC8 is on seeking resources. The findings agree with Hite and Hesterly (2001) who found that a proactive network (N14) is a calculated behaviour to access other firms that contribute to the growth of an organization. In the Chinese construction market, partnering local PRC firms (N9) is an approach to achieve complementary capability to deal with the local environment. Furthermore, it is a channel to share and learn knowledge (N13) to improve competitiveness in handling projects in China.

The findings suggest that it is important for foreign firms to have access to resources in China. It agrees with Ling et al. (2005) who found that consultants should form project JVs with Chinese firms. In JVs, firms can access partner’s superior technology

(Sridharan, 1998), and share a local partner’s knowledge of the host country’s competitive conditions, culture, language, political systems and business systems (Kogut and Singh, 1988).

6.5 Strategies to achieve competitive performance-- results of PLS analysis

The underlying structures identified and confirmed through EFA and CFA are useful in understanding the critical strategies adopted by foreign firms as well as the important practices to achieve these strategies. The focus of this section is on the development and evaluation of the relationships among critical strategies and competitive performance. This involves the assessment of the path coefficients that describe the hypothesized relationships among the constructs. The path coefficients, which are statistically significant in supporting the hypothesized relationships, are used to address the third research objective in this study. Figure 6.1 shows the PLS model consisting of 8 predictor constructs and two dimensions of competitive performance. Table 6.14 shows the two structural equations formed in the PLS model. Table 6.15 shows the associated outer and weight relationships between the predictor constructs and their corresponding measurement items of the PLS model. In this study, there are 43 measurement equations derived to represent the outer relationships, and ten weight relationships.



Legend
η_n Dependent construct
ξ_n Independent construct
λ_n Paramenter estimate

Figure 6.1 PLS PSN framework

Table 6.14 Inner relations (structural relationships) among constructs for PSN model

Inner relations-Latent structural equations ($\eta_i = \lambda_{\gamma}\xi_4 + \Omega_i$)
$\eta_1 = \lambda_{1.1}\,\xi_1 + \lambda_{1.2}\,\xi_2 + \lambda_{1.3}\,\xi_3 + \lambda_{1.4}\,\xi_4 + \lambda_{1.5}\,\xi_5 + \lambda_{1.6}\,\xi_6 + \lambda_{1.7}\,\xi_7 + \lambda_{1.8}\,\xi_8 + \Omega_1$ $\eta_2 = \lambda_{2.1}\,\xi_1 + \lambda_{2.2}\,\xi_2 + \lambda_{2.3}\,\xi_3 + \lambda_{2.4}\,\xi_4 + \lambda_{2.5}\,\xi_5 + \lambda_{2.6}\,\xi_6 + \lambda_{2.7}\,\xi_7 + \lambda_{2.8}\,\xi_8 + \Omega_2$

Table 6.15 Outer relations and weight relations between predictor constructs and their corresponding observed variables for PSN model

Construct	**Indicator code for Observed variable (measurement items)**	**Outer relation reflective measurement equations** ($x_s = \lambda_{xs}\,\xi_r + \varepsilon_{xs}$, $y_s = \lambda_{ys}\,\eta_\beta + \varepsilon_{ys}$)	**Weight relations** ($\xi_r = \omega_{\xi r} x_s$, $\eta_\beta = \omega_{\eta\beta}\, y_s$)
Differentiation (ξ_1)	$x_{1.1}$-D_1, $x_{1.2}$-D_2, $x_{1.3}$-D_3, $x_{1.4}$-D_4, $x_{1.5}$-D_5, $x_{1.6}$-D_6,	$x_{1.1} = \lambda_{x1.1}\,\xi_1 + \varepsilon_{1.1}$, $x_{1.2} = \lambda_{x1.2}\xi_1 + \varepsilon_{1.2}$, $x_{1.3} = \lambda_{x1.3}\,\xi_1 + \varepsilon_{1.3}$, $x_{1.4} = \lambda_{x1.4}\,\xi_1 + \varepsilon_{1.4}$, $x_{1.5} = \lambda_{x1.5}\,\xi_1 + \varepsilon_{1.5}$, $x_{1.6} = \lambda_{x1.6}\,\xi_1 + \varepsilon_{1.6}$	$\omega_{\xi1.1}x_{1.1} + \omega_{\xi1.2}x_{1.2} + \omega_{\xi1.3}x_{1.3} + \omega_{\xi1.4}x_{1.4} + \omega_{\xi1.5}x_{1.5} + \omega_{\xi1.6}x_{1.6}$
Focus (ξ_2)	$x_{2.1}$-F_4, $x_{2.2}$-C_9, $x_{2.3}$-F_2	$X_{2.1} = \lambda_{x2.1}\,\xi_2 + \varepsilon_{2.1}$, $x_{2.2} = \lambda_{x2.2}\xi_2 + \varepsilon_{2.2}$, $x_{2.3} = \lambda_{x2.3}\,\xi_2 + \varepsilon_{2.3}$	$\omega_{\xi2.1}x_{2.1} + \omega_{\xi2.2}x_{2.2} + \omega_{\xi2.3}x_{2.3}$
Cost leadership (ξ_3)	$x_{3.1}$-C_1, $x_{3.2}$-C_2, $x_{3.3}$-C_5, $x_{3.4}$-C_6	$X_{3.1} = \lambda_{x3.1}\,\xi_3 + \varepsilon_{3.1}$, $x_{3.2} = \lambda_{x3.2}\xi_3 + \varepsilon_{3.2}$, $x_{3.3} = \lambda_{x3.3}\,\xi_3 + \varepsilon_{3.3}$, $x_{3.4} = \lambda_{x3.4}\,\xi_3 + \varepsilon_{3.4}$	$\omega_{\xi3.1}x_{3.1} + \omega_{\xi3.2}x_{3.2} + \omega_{\xi3.3}x_{3.3} + \omega_{\xi3.4}x_{3.4}$
Risk responsiveness (ξ_4)	$x_{4.1}$-MI_3, $x_{4.2}$-A_4, $x_{4.3}$-MI_6, $x_{4.4}$-S_1, $x_{4.5}$-A_3, $x_{4.6}$-MI_4, $x_{4.7}$-A_7, $x_{4.8}$-S_6,	$X_{4.1} = \lambda_{x4.1}\,\xi_4 + \varepsilon_{4.1}$, $x_{4.2} = \lambda_{x4.2}\xi_4 + \varepsilon_{4.2}$, $x_{4.3} = \lambda_{x4.3}\,\xi_4 + \varepsilon_{4.3}$, $x_{4.4} = \lambda_{x4.4}\,\xi_4 + \varepsilon_{4.4}$, $x_{4.5} = \lambda_{x4.5}\,\xi_4 + \varepsilon_{4.5}$, $x_{4.6} = \lambda_{x4.6}\,\xi_4 + \varepsilon_{4.6}$, $X_{4.7} = \lambda_{x4.7}\,\xi_4 + \varepsilon_{4.7}$, $x_{4.8} = \lambda_{x4.8}\,\xi_4 + \varepsilon_{4.8}$	$\omega_{\xi4.1}x_{4.1} + \omega_{\xi4.2}x_{4.2} + \omega_{\xi4.3}x_{4.3} + \omega_{\xi4.4}x_{4.4} + \omega_{\xi4.5}x_{4.5} + \omega_{\xi4.6}x_{4.6} + \omega_{\xi4.7}x_{4.7} + \omega_{\xi4.8}x_{4.8}$
Market-oriented swiftness (ξ_5)	$x_{5.1}$-S_5, $x_{5.2}$-S_4, $x_{5.3}$-A_2, $x_{5.4}$-A_1	$X_{5.1} = \lambda_{x5.1}\,\xi_5 + \varepsilon_{5.1}$, $x_{5.2} = \lambda_{x5.2}\xi_5 + \varepsilon_{5.2}$, $x_{5.3} = \lambda_{x5.3}\,\xi_5 + \varepsilon_{5.3}$, $x_{5.4} = \lambda_{x5.4}\,\xi_5 + \varepsilon_{5.4}$	$\omega_{\xi5.1}x_{5.1} + \omega_{\xi5.2}x_{5.2} + \omega_{\xi5.3}x_{5.3} + \omega_{\xi5.4}x_{5.4}$
Client-oriented swiftness (ξ_6)	$x_{6.1}$-S_3, $x_{6.2}$-S_2, $x_{6.3}$-A_5	$X_{6.1} = \lambda_{x6.1}\,\xi_6 + \varepsilon_{6.1}$, $x_{6.2} = \lambda_{x6.2}\xi_6 + \varepsilon_{6.2}$, $x_{6.3} = \lambda_{x6.3}\,\xi_6 + \varepsilon_{6.3}$	$\omega_{\xi6.1}x_{6.1} + \omega_{\xi6.2}x_{6.2} + \omega_{\xi6.3}x_{6.3}$
Trust Network (ξ_7)	$x_{7.1}$-N_{11}, $x_{7.2}$-N_1, $x_{7.3}$-N_3, $x_{7.4}$-N_2, $x_{7.5}$-N_{18}	$X_{7.1} = \lambda_{x7.1}\,\xi_7 + \varepsilon_{7.1}$, $x_{7.2} = \lambda_{x7.2}\xi_7 + \varepsilon_{7.2}$, $x_{7.3} = \lambda_{x7.3}\,\xi_7 + \varepsilon_{7.3}$, $x_{7.4} = \lambda_{x7.4}\,\xi_7 + \varepsilon_{7.4}$, $x_{7.5} = \lambda_{x7.5}\,\xi_7 + \varepsilon_{7.5}$	$\omega_{\xi7.1}x_{7.1} + \omega_{\xi7.2}x_{7.2} + \omega_{\xi7.3}x_{7.3} + \omega_{\xi7.4}x_{7.4} + \omega_{\xi7.5}x_{7.5}$
Resource Network (ξ_8)	$x_{8.1}$-N_4, $x_{8.2}$-N_{16}, $x_{8.3}$-$N1_3$, $x_{8.4}$-N_9	$X_{8.1} = \lambda_{x8.1}\,\xi_8 + \varepsilon_{8.1}$, $x_{8.2} = \lambda_{x8.2}\xi_8 + \varepsilon_{8.2}$, $x_{8.3} = \lambda_{x8.3}\,\xi_8 + \varepsilon_{8.3}$, $x_{8.4} = \lambda_{x8.4}\,\xi_8 + \varepsilon_{8.4}$	$\omega_{\xi8.1}x_{8.1} + \omega_{\xi8.2}x_{8.2} + \omega_{\xi8.3}x_{8.3} + \omega_{\xi8.4}x_{8.4}$

6.5.1 Evaluation of PSN model

The evaluation of the PSN model starts with examining the magnitude of the variance explained (R^2) for each predicted (dependent) constructs. During the evaluation of R2s, the percentage of variance (PV) explained by each predictor construct is derived. Using a set of rules to evaluate R2 as well as PV, a trimming process is conducted to eliminate redundant paths in the model until satisfactory results are achieved. Finally, the trimmed model was evaluated via overall F-test to ensure the significance of R^2 of the trimmed model.

6.5.1.1 Trimming PSN model

The trimming process is conducted to eliminate redundant predictors for the respective predicted constructs, thus refining and improving the quality of the PSN model. The percentage of variance (PV) explained by the constructs is the rule to determine the elimination of constructs (see Section 5.7.3.6). Table 6.16 shows that three out of 16 proposed paths are considered as redundant with PV ranging from 1.23% to 1.49%, which are bellow the cut-off value of 1.5% (absolute value). Among them, one (FAC2) is related to Y2, two (FAC2 and FAC6) are related to Y1.

Since these three paths contribute little to explain the variance of predicted constructs, the PSN model was reassessed after three paths were removed. It should be noted that the removal of these three paths did not have any negative influence on the explanation power of the PSN model since there is no huge difference between R^2s before and after the trimming process. At the same time, after the elimination of these three paths, F-statistics of Y became higher than it was in the original PSN model. When all the constructs in the refined PSN model account for more than 1.5% of variance in their respective predicted constructs, no further trimming was conducted.

Table 6.16 Results of PSN model in trimming process

Relationships	Original PSN model			Trimmed PSN model		
	Path coefficient	Correlation	PV%	Path Coefficient	Correlation	PV%
FAC1--------Y1	0. 058	0.425	2.47	0.067	0.425	2.85
FAC2--------Y1	-0.039	0.315	-1.23			
FAC3--------Y1	0.452	0.524	23.69	0.412	0.524	21.59
FAC4--------Y1	0.210	0.412	8.64	0.227	0.412	11.21
FAC5--------Y1	0.397	0.489	19.41	0.350	0.489	14.77
FAC6--------Y1	-0.034	0.423	-1.44			
FAC7--------Y1	-0.111	0.357	-3.94	-0.157	0.356	-5.60
FAC8--------Y1	-0.293	0.230	-6.75	-0.301	0.230	-6.93
FAC1--------Y2	0.645	0.762	49.12	0.650	0.761	49.46
FAC2--------Y2	-0.046	0.323	-1.49			
FAC3--------Y2	0.347	0.538	18.65	0.338	0.538	18.15
FAC4--------Y2	0.319	0.638	20.39	0.331	0.639	16.85
FAC5--------Y2	-0.080	0.510	-4.07	-0.099	0.510	-5.05
FAC6--------Y2	-0.252	0.403	-10.16	-0.260	0.404	-10.51
FAC7--------Y2	-0.204	0.470	-9.58	-0.215	0.470	-10.09
FAC8--------Y2	0.110	0.497	5.45	0.102	0.497	5.06

Though the trimmed PSN model achieves a reasonable satisfactory predictive power because R^2s are greater than the threshold value of 0.10, the statistical significances of R^2s still need to be tested. Table 6.17 shows that the overall results of the F-test for individual predicted constructs in both the original and the trimmed PSN model are all statistically significant at $p<0.05$ level. Besides, F values because higher after the PSN model is trimmed. The null hypothesis that variances explained for all predicted constructs are equal to 0 can therefore be rejected.

Table 6.17 Results of F-test for R^2 in PSN model

	Original PSN model			Trimmed PSN model		
	R^2	F-statistic	Sig (p)	R^2	F-statistic	Sig (p)
Y1	0.410	2.43	<0.05	0.401	4.15	<0.01
Y2	0.683	7.54	<0.01	0.682	18.06	<0.01

6.5.1.2 Assessment of path coefficients

The focus of this section is to assess the path coefficients that describe the

hypothesized relationships among the constructs. The significance of individual path coefficients was determined by t-statistics, which are the results of bootstrapping technique. The standardized path coefficient and corresponding t-statistics are summarized in Table 6.18. Among the13 hypothesized paths in trimmed PSN model, seven are statistically significant at $p<0.05$. These seven paths support the hypothesized relationships among the predicted constructs and the predictor constructs in this research. The predicted constructs in the PSN model, Y1 and Y2, have three and four significant relationships respectively with the predictors. Each predictor construct has one negative relationship with a predictor construct. The significant relationships in the PSN model are shown in figure 6.2.

Table 6.18 Results for paths in trimmed PSN model

	Standardized path coefficients	Percent variance explained	T-Statistics
FAC1--------Y1	0.067	2.85	0.333
FAC3--------Y1	0.412	21.59	1.993
FAC4--------Y1	0.227	11.21	0.947
FAC5--------Y1	0.350	14.77	1.971
FAC7--------Y1	-0.157	-5.60	0.798
FAC8--------Y1	-0.301	-6.93	2.036
FAC1--------Y2	0.650	49.46	2.573
FAC3--------Y2	0.338	18.15	1.908
FAC4--------Y2	0.331	16.85	1.749
FAC5--------Y2	-0.099	-5.05	0.661
FAC6--------Y2	-0.260	-10.51	2.049
FAC7--------Y2	-0.215	-10.09	0.991
FAC8--------Y2	0.102	5.06	0.808

The results also show that it is better to combine strategies than adopting a single strategy. The roles played by each strategy towards firms' competitiveness (Y_1 and Y_2) may be seen from the percentage of variance accounted for (PV) shown in Table 6.18. Using Y_1 as an example, if only Porter's generic strategy is considered, the total PV would be 24.44%. However, by combining Porter, Sun Tzu and social network theory,

the total PV is 37.89%. The increase in PV suggests that the combined strategies (FAC1 and FAC3 from Porter; FAC4 and FAC5 from Sun Tzu; FAC7 and FAC8 from networking) have greater influence over a firm's Y_1 quantitative competitiveness, than just Porter alone (24.44%), or Sun Tzu alone (25.98%).

6.5.2 Discussion of findings on strategies to achieve competitive performance

This section interprets and discusses the findings of the trimmed PSN model. The observed relationships are explained by the measurement items of the respective predictor and predicted constructs.

Figure 6.2 shows there are two configurations of combined factors with regard to the two dimensions of competitive performance. These configurations support the hypothesis that the critical strategies of Porter, Sun Tzu and Network have combined effects on a firm's competitive performance. According to the strategies to achieve a competitive Y1, the results indicate that the cost leadership (FAC3) and market-oriented swiftness (FAC5) factors play a positive role while the resource factor (FAC8) has a negative influence.

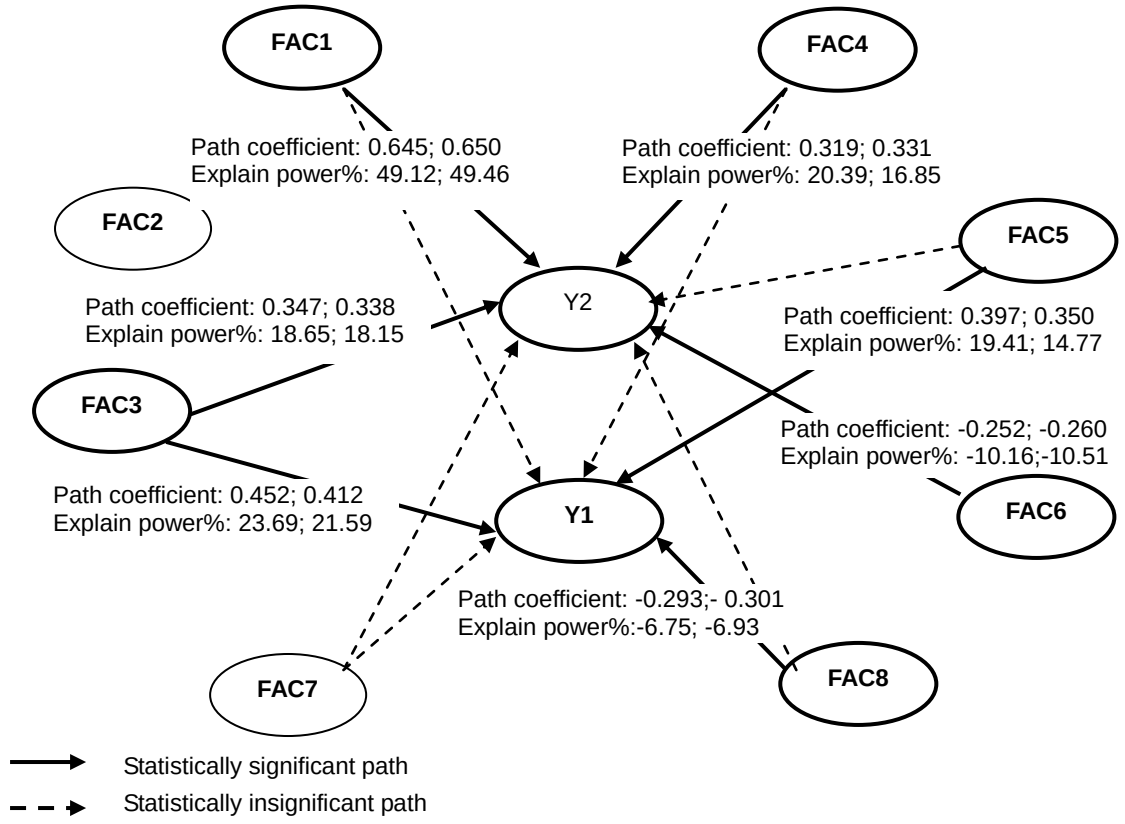


Figure 6.2 Statistically significant paths in the trimmed PSN model

Turing to the other configuration, four predictor constructs are found to play a statistically significant role in achieving competitiveness in Y2. Three of them, In particular- differentiation factor (FAC1), cost leadership factor (FAC3) and risk responsiveness factor (FAC4)-have positive standardized path coefficients. FAC 6, which is client-oriented swiftness, shows a negative influence on Y2. The composition of factors in Y2 shows that while it is necessary for a firm to adopt the strategies of differentiation, cost leadership and risk responsiveness to achieve competitiveness, it must also be cautious in implementing a client-oriented strategy.

The focus-training factor (FAC2) does not contribute to the competitive performance of either Y1 or Y2 since it does not account for more than 1.5% of the variance of a firm's performance. Similarly, the hypothesis that client-oriented swiftness (FAC6) may contribute to the competitive performance of Y1 is rejected because of the very small

variance of Y1 that is explained by this strategy.

Figure 6.2 also shows that although the trust factor (FAC7) has an effect on both Y1 and Y2, the relationship is too weak due to the statistically insignificant t-value of the path coefficients. The explanation for this phenomenon may lie in the gap between a firm's performance and its partnership performance. The trust network strategy has a positive influence in keeping the long-term relationship between the partners. However, this may not necessarily contribute to a firm's performance.

In the following two sections, two lines of strategies, the relationships between significant strategies and corresponding performance dimensions are discussed.

6.5.3 Configuration 1-strategies to achieve Y1

The compositions of competitive performance (Y1) number of projects (P1), value of projects (P2) and profitability (P3). The first Configuration concerns achieving good performance in Y1 by adopting cost leadership factor (FAC3), market-oriented swiftness factor (FAC5) and resource-network factor (FAC8) strategies. Among these three strategies, cost leadership (FAC3) and market-oriented swiftness factor (FAC5) has positive effects on Y1, while resource factor (FAC8) influences Y1 negatively. With regard to the absolute value of PV values of these three strategies, cost leadership is the strongest in explaining the variance of Y1.

In Configuration 1, the combined effect of cost leadership factor (FAC3) and market-oriented swiftness factor (FAC5) on Y1 may be explained as follows. Adopting the cost leadership factor (FAC3) suggests that a firm has achieved certain economies of scale. Taking an architectural design firm as an example, the firm is able to capture a broader segment of the market by capitalizing on the special skills and adequate

experiences it has acquired in designing high-rise buildings. As the number of these high-rise building projects increases, the firm will enjoy greater benefits through the reduced costs of individual project, while gaining a larger market share. Hence, it is necessary to be both acute and agile in order to achieve the right balance between certain economies of scale and changes in the market.

The results in Configuration 1 show that resource factor (FAC8) has a negative influence on Y1. Although globalization requires cost leaders to consider integration and alliance strategies to gain better control or achieve complementary abilities to build a strong position for themselves, this finding indicates that the resource factor (FAC8) has negative effect on performance in Y1. This may be explained by the conflicting functions between FAC5 and FAC8 in improving performance in Y1. Networking with other firms may increase competence of the firm, but at the same time it may also limit the firm's flexibility to adapt to changes.

6.5.3.1 Cost Leadership (FAC3) strategy to achieve competitive Y1

Figure 6.3 shows that when a firm reconfigures its value chain (C5), establishes vertical linkages (C2) and learns continuously (C1), there is a correlation with Y1, which is constructed by the number of projects (P1), value of projects (P2) and profitability (P3). The results in Figure 6.3 suggest that to achieve good performance in Y1, foreign firms should reconfigure their value chains according to the real environment in China's construction market, set up vertical linkages to obtain relatively cheaper resources and to identify areas where they can learn to reduce cost. In particular, among these three practices--firm reconfigures its value chain (C5) correlates with all three items under Y1. At the same time, C5 loads the largest factor on cost leadership (FAC3) at 0.788. In contrast, "firm reduces costs in its operations"

(C6) does not correlate with any of the items of Y1.

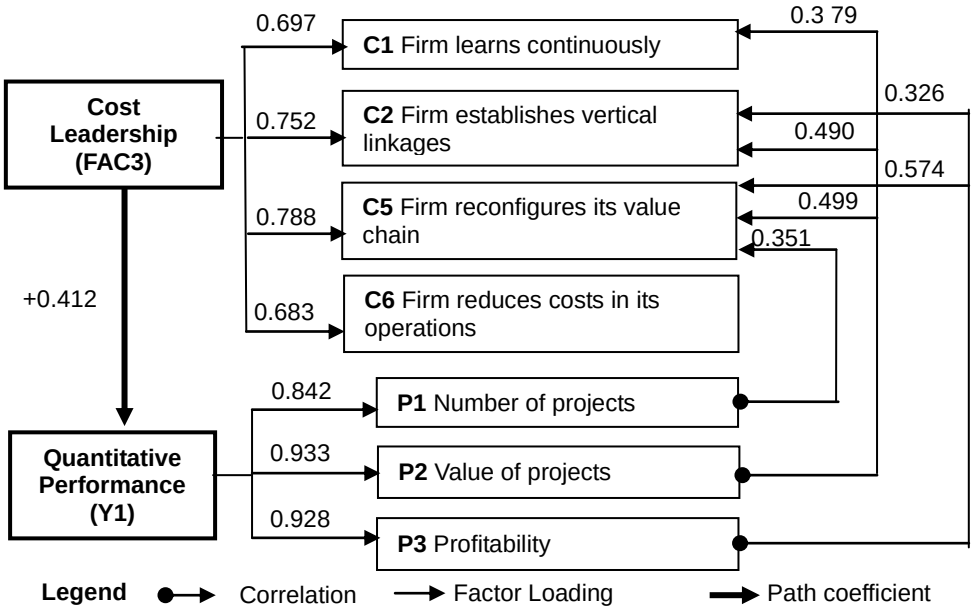


Figure 6.3 Relationships between Cost leadership and Y1

The relationship between establishing vertical linkages (C2) and performance in Y1 is consistent with the finding that vertical integrations can improve cost control (Friedman, 1984) and enable firms to maximize long-term corporate wealth (Harrigan, 1983a). The respondent firms usually establish vertical linkages with local design firms, contractors and subcontractors, material and equipment suppliers, as well as clients. Setting up a linkage with local design firms can help foreign firms to reduce costs and improve their understandings of the complicated regulations in China's construction industry (Xu et al., 2004). At the same time, by linking up with certain local design firms, foreign firms are able to access some of the larger projects that are financed by special donors. Linking up with local contractors and sub-contractors enables foreign firms to capitalize on their strengths in providing integrated services when they undertake international projects. Besides, by integrating certain services, foreign firms are able to increase their share of the markup that would otherwise be given to sub-contractors or other parties involved in the integration (Hammond 1984). Foreign firms who link up with

local material and equipment suppliers are able to obtain large profit margins by procuring cheap China-made materials and equipments and then selling them to other firms operating globally.

It is also important for foreign firms to establish linkages with clients. Foreign firms that follow their clients overseas will be able to reduce costs in sourcing and securing projects in the new market through these linkages. This is consistent with the finding of Khalfan and McDermott (2006), that the biggest cost reduction is achieved through not having to incur cost in tendering for jobs for the same client for a period of ,say, three to five years.

The results show significant correlation between foreign firms reconfiguring the value chain (C5) and performance in Y1. This further supports the viewpoint that a project starts from a “as-is” model, i.e. a designed model based on previous designs, to a “to-be” model, i.e. a real model based on delivery process (Lindfors, 2000). In the face-to-face interviews, respondents also emphasized this correlation. A respondent explained:

> *As the project manager of a commercial project, we realized that the success of the project depends on the extent to which we are able to devise a good fit between the diverse competences of all the participants and the real task requirements. The name of this game is differences reduction.*
>
> *Since the professional cultures of those working in the traditional Chinese construction industry differs from ours, the scope and concept of individual responsibilities are quite differently perceived. We decided to expand the time allocated to the preliminary design phase to avoid any no-value-added activity*

further along the process. At the same time, we gathered representatives from the various parts of the value chain to attend several meetings during the preliminary design phase. The discussions uncovered two gaps in the participants' understanding of project delivery. The good news is that commitment to all the different parts was achieved and detailed job responsibilities were distributed. This rearrangement of activities on the value chain according to the real situation pertinent to that particular task environment filled possible gaps in advance, thus avoiding extra cost at the final stage.

The above manager also mentioned that:

The redesign of activities of the value chain, based on participants' professional behaviour, also provided learning opportunities, thereby contributing to the performance of the next project.

This interviewee's words support Kululanga et al. (2001) and Murray and Chapman (2003) who found that organizational learning is linked to continuous improvement in an organization's performance.

6.5.3.2 Market-oriented swiftness (FAC5) strategy to achieve competitive Y1

Figure 6.4 shows that market-oriented swiftness (FAC5) makes a positive contribution to performance in Y1. Among the four measurement items that construct market-oriented swiftness, creating an adaptable organizational structure (A1), doing innovative marketing for products in advance (A2) and keeping its service/product continuously innovated (S5) are correlated with both "value of project" (P2) and "profitability" (P3).

The relationship between "keeping service/product continuously innovated" (S5) and

"profitability" (P3) supports research findings that innovation, whether it is fundamental (Cooner, 1991) or adaptive (Porter, 1990; Kotler, 1997), can improve profitability. In the current Chinese construction market in particular, increasing environmental awareness makes innovations in providing green products/services and appropriate green marketing tools even more important than ever (Peattie and Crane, 2005). This is consistent with the information provided by one interviewee:

> *China has 11 "green city" projects underway and more than 140 major green building projects. To show strong competitiveness in handling these projects, low energy use, intelligent integrated designs and materials and recycling water systems are vital capabilities. Attracted by the potential market for energy-efficient and related green materials and technologies in China's building sector, we decided to exhibit different levels of innovation in our products/services. This is an effective approach to improve our performance. At the same time, only by constantly providing innovative products/services can we be ahead of local firms. Even then, they are fast learners and good at imitation.*

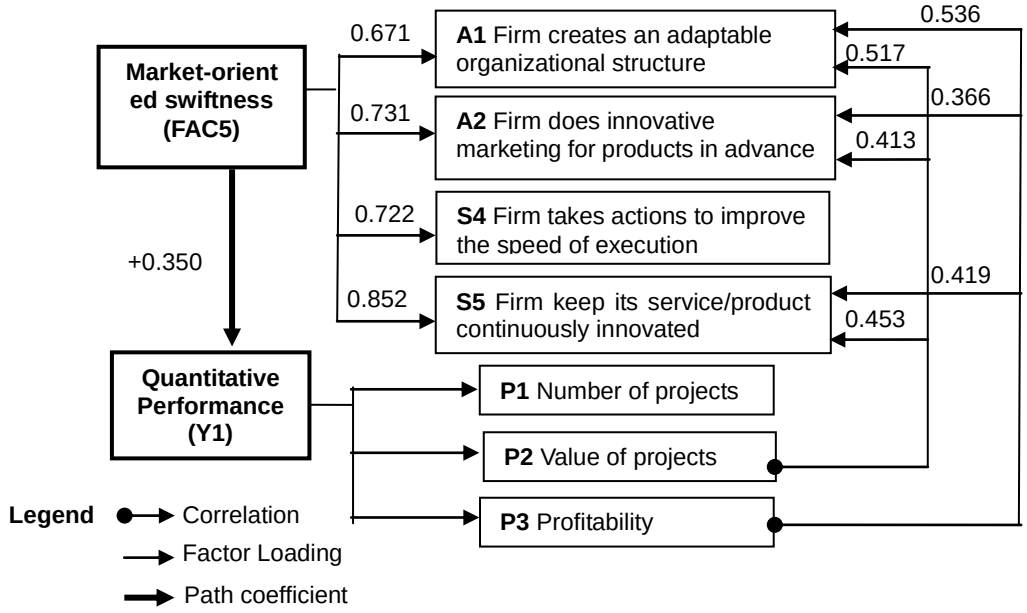


Figure 6.4 Relationships between Market-oriented swiftness and Y1

Figure 6.4 shows that innovative marketing for product in advance (A2) and performance in Y1 are significantly correlated. Those firms that constantly provide innovative products/services to be ahead of others need to look for markets where their products are viewed as new and innovative. Considering there is an adoption process of new products and different characteristics of customers along the diffusion of innovation (Rogers, 1983), a necessary strategy for the successful development of innovative products is to introduce and diffuse ideas of products based on a detailed understanding of market trends and customer preferences in advance.

An adaptable organizational structure (A1) and performance in Y1 are strongly correlated. Many researchers (Miles et.al., 1997; Schminke et.al., 2002) agree that a decentralized and less formalized organizational structure is conducive to organizational effectiveness. In the face-to-face interview, interviewees suggested adopting specific organization forms according to particular conditions faced by individual firms. This mirrors Robins' (1983) finding that the structure of a firm should be adaptable to the local environment and the unique task environment. From interviewees' perspective, the features of an adaptable structure include less interdependence, more organic form, and presence of lateral communication.

6.5.3.3 Resource-network (FAC8) strategy to achieve competitive Y1

The relationship between resource-factor (FAC8) and performance in Y1, as well as correlations between measurement items, is shown in figure 6.5. The results indicate that resource factor has a negative effect on performance in Y1. There are no significant correlations between predictor measurement items and predicted ones. This may be attributed to the small sample size of the survey, and it is possible that certain measurement items may show significant correlation with P1, P2 and P3 if the

sample size is large enough. On this basis, the negative effect on performance is attributes to the vector combination of these four items (N4, N9, N13 and N14).

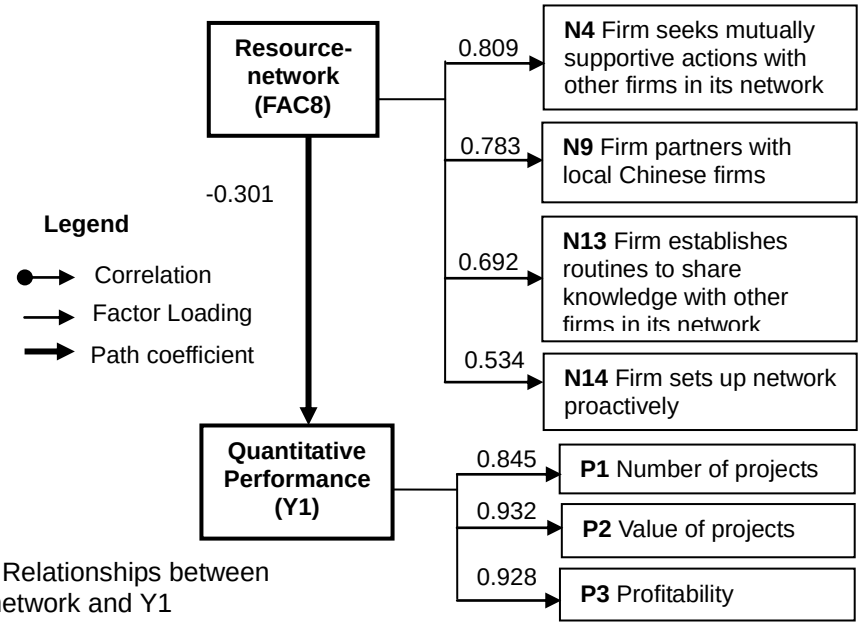


Figure 6.5 Relationships between resource-network and Y1

Partnering with local Chinese firms (N9) is a way to supplement the foreign firms' resources with those that may be otherwise unavailable internally (Barney, 1991), thereby improving a firm's performance. Setting up routines to share knowledge with other firms (N13) is good for the collective learning of an organization, contributing to good performance (Fu et.al., 2006). However, results imply that more supports a firm has from other firms and more partnerships it has with local firms may possibly lead to reduced competitiveness in Y1. This is consistent with previous findings that too much dependence on partners constrains a firm's bargaining power (Pfeffer and Salancik, 1978) and appropriation capacity (Lavie, 2004), which in turn results in declining market performance.

Another explanation for the negative relationship between FAC8 and Y1 may lie in foreign firms becoming uncompetitive when they collaborate with competitors to add value to their products/services (N10) and enlarge the number of partners (N17) (see section 6.3). Prior studies have noted that bilateral competition has a positive effect on

market returns (Koh and Venkatraman, 1991). In addition, multilateral competition has a positive relationship with market performance (Lavie, 2004). Therefore, foreign firms may miss the opportunity to achieve value created by horizontal alliances because of their avoidance of collaborating with competitors to add value to products/services (N10). Even if value has been created by partners, the reduced competitiveness in enlarging the number of partners (N17) may lower a firm's bargaining position for value appropriation. To set up new partnerships, a firm may also incur additional costs which will have a negative effect on its performance.

6.5.4 Configuration2-strategies to achieve Y2

The compositions of competitive performance (Y2) are quality output (P4), client's satisfaction (P5) and public image (P6). Results show that Configuration 2 includes differentiation factor (FAC1), cost leadership factor (FAC3), risk responsiveness factor (FAC4) and client-oriented swiftness factor (FAC6).

In particular, the differentiation factor (FAC1) seems to be a strong predictor to achieve competitiveness in Y2, with strong path coefficient and PV value. Compared with the other strategies in this configuration, in terms of percentage of variance explained, the differentiation factor (FAC1) is predominant by explaining 49.46% of variance of Y2. At the same time, the path relationship between differentiation strategy and Y2 is also very strong (0.650). "Cost leadership" factor (FAC3) and "risk responsiveness" factor (FAC4) also make positive influence on performance, with quite similar PV values respectively at 18.15% and 16.85%. At the same time, it should be noted that "risk responsiveness" plays a less important role than "cost leadership" in explain the variance of Y2. Opposite to the above three positive relationships, "client-oriented swiftness" factor (FAC6) negatively affects performance in Y2.

The results of Configuration 2 show that customers' perceptions of the firm are important. "Differentiation" is important to achieve high customer loyalty, by tailoring product/services according to customer's requirements and transferring unique messages of products/services to customers (McCracken, 2002). Along with this differentiation strategy, adaptability to differences of customers' wills in local market is also emphasized in Configuration 2. Based on discussion in section 6.4.4.2, it is seen to be helpful for firms to adopt the components of the risk responsiveness factor (FAC4), i.e. risk assessment and adaptability, when they take aggressive moves in the host country.

However, the client-oriented swiftness (FAC6) brings negative effects on performance in Y2. It is a counter intuitive result, and it is contrary to what most business consultants and high performing companies recommend. It seems that "providing unique products for the end user" in market and "providing client-oriented services to client" play opposite roles to achieve qualitative performance. A possible explanation of this phenomenon is that, compared to end user, clients consist of interconnected shareholders with vociferous and comprehensive requirements. Beside the functional usage of the facility, clients have demands for development. Clients may constitute dangers to firms because their powers to withdraw from the project and their unpredictability (Newcombe, 2003). Though establishing innovative and client-oriented business segments to create added value for the client cannot be adopted easily by competitors (Girmscheid, 2004c), compared to how much foreign firms have invested, the returns might be low.

Configuration 2 also indicates that it is compatible to conduct "differentiation" and "cost leadership" strategies concurrently when firm is achieving competitiveness in Y2. This

is consistent with Solberg and Durrieu (2008) who found that differentiators may indeed take bold steps in international markets, if only the cost position of the company is favorable. The competitive advantage of firms conducting differentiation lies in the brand and/or the product, but like cost leaders, they also seek to capture a greater share of the market. Although costs and prices are not the main focuses for differentiators, they should be considered (Hlavacka et al., 2001), since firms must be prepared to add a premium to costs to achieve unique features and characteristics of products. To balance these “premium costs” and “uniqueness”, the managerial tactics of cost leadership will be helpful. In addition, it should be noted that, some measurement items’ under cost leadership in this research, may contribute to Y2 indirectly via affecting “differentiation”. For example, while adopting a differentiation strategy, firms may require achieve resources from vertical linkages (C2), which is an item under cost leadership factor (FAC3).

6.5.4.1 Differentiation Strategies to achieve competitive Y2

Figure 6.6 shows that achieving competitiveness in quality (P4) is positively and significantly correlated with all the practices under differentiation strategy. Providing high quality products/services (D4) has the highest factor loadings (0.891) on differentiation factor (FAC1). All measurement items under differentiation are strongly correlated with “providing high quality products/services”.

Client’s satisfaction (P5) is correlated with high quality inputs (D2) and superior techniques and technologies in product delivery (D3). D2 and D3 are in relation to both the beginning and the production and the process of product delivery. This shows that client’s consideration is not just narrowly focused on the performance of the final product/service, but on the whole process of production. Foreign firms can therefore

make a good impression on clients by highlighting these two aspects (D2 and D3) when communicating with their clients. This is consistent with Allen and Helms (2006) who found that by building a reputation of being technologically advanced, a firm is assured of meeting new clients as well as catering to the demands of existing client's demands for product/service uniqueness.

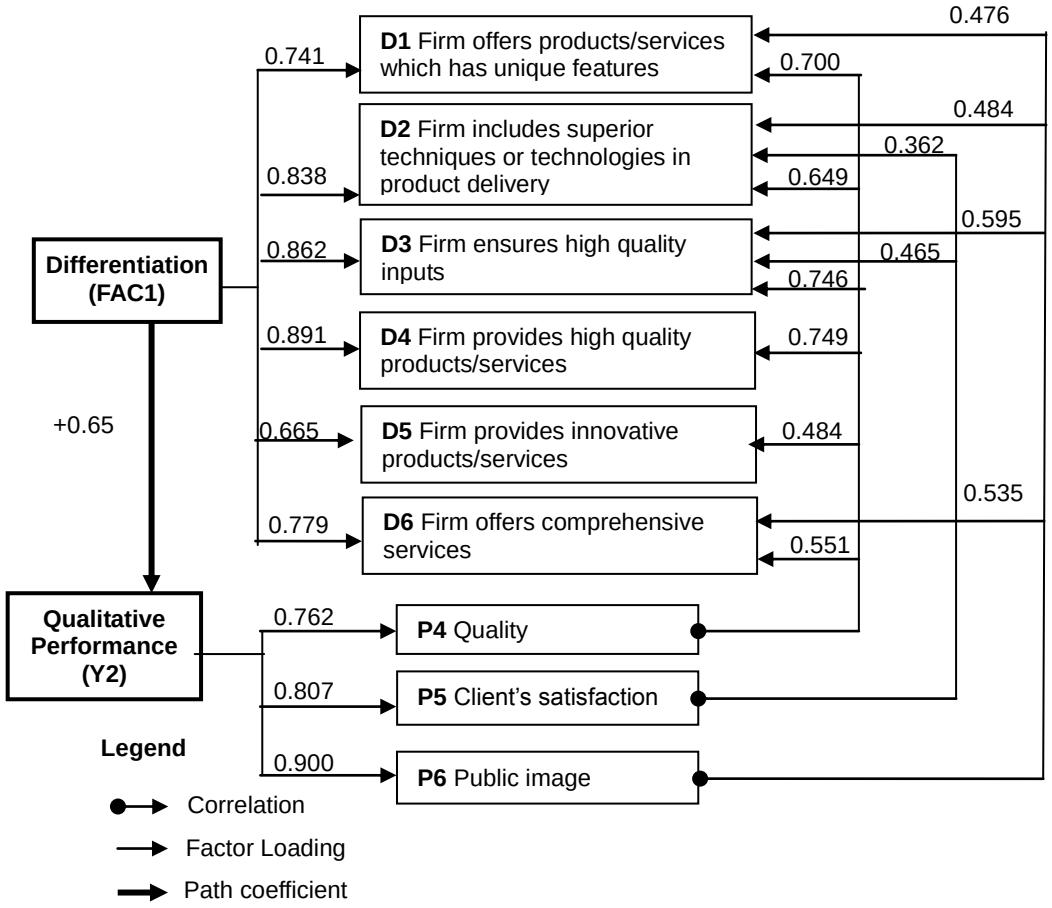


Figure 6.6 Relationships between Differentiation and Y2

Public image (P6) represents a population's general attitude towards foreign firms. Compared to client's satisfaction (P5), public image (P6) correlates with more predictor items. The results from figure 6.6 show that besides the factors generally considered by clients, public image is also influenced by unique features (D1) and comprehensive services (D6). This is because the public represents the people who actually use a product or service besides "paying the bill" for it (Peter and Austin, 1985). Furthermore,

considerations of D1 and D6 points to the increasingly sophisticated tastes and requirements of customers. In the face to face survey, one interviewee explained that:

> *When we introduce our products to Chinese user, we need to be careful about how we transfer our ideas to them. These customers emphasize feelings relating to both material and spiritual aspects. For example, to satisfy customers' requirements of an innovative lifestyle and status, we not only equip that residential community with high-tech material facilities, but also input new ideas into our personalized after-sale services. The results show that customers are willing to pay a high price for such services, which are not easily imitated, differentiate themselves from others.*

6.5.4.2 Cost leadership strategies to achieve competitive Y2

From figure 6.6, it can be seen that all measurement items under cost leadership, i.e. firm establishes vertical linkages (C2), firm reconfigures its value chain (C5), firm reduces costs in operations (C6) and firm learns continuously (C1) have significant correlation with Performance. Among these four items, C2 and C1 have stronger correlations with the measurement items of performance. Therefore, by adopting the continuous learning (C1) and establishing vertical linkages (C2), a firm may have more opportunities to achieve good performance in Y2.

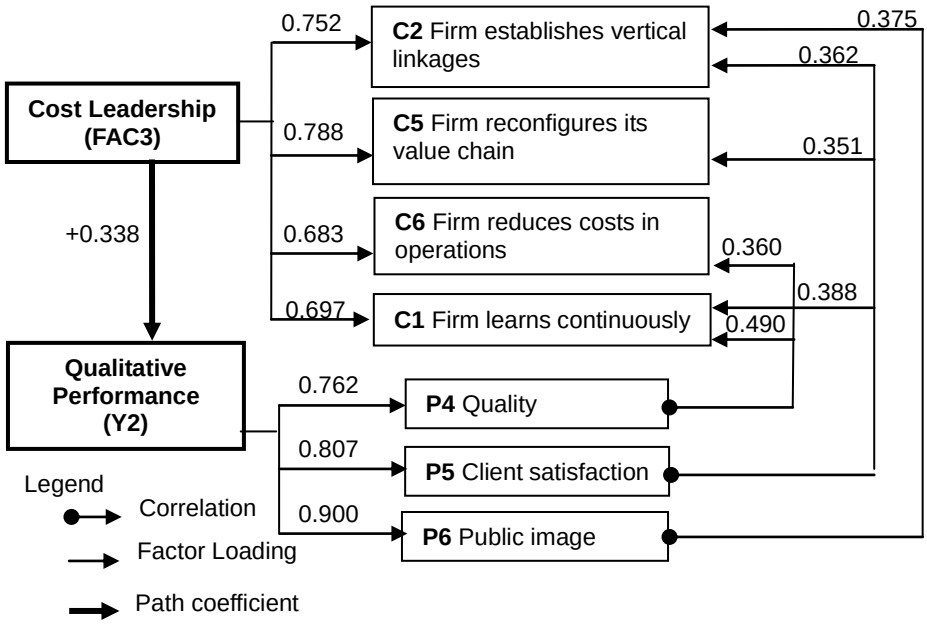


Figure 6.7 Relationships between Cost leadership and Y2

Continuous learning (C1) contributes to competitive performance is consistent with the finding by Baker and Sinkula (1999) that there is a positive relationship between a firm's performance and its learning orientation. When handling project in a host country, a firm's aptitude for continuous learning with regard to complex product development process and different customer requirements is important to ensure it performs well in terms of quality and customer satisfaction. When practitioners make non-routine decisions or solve problems encountered at work, which are beyond the domain of their specialized knowledge, self-learning and learning from other practitioners are necessary. This is also supported by an interviewee who shared that:

> *Continuous learning is important as it helps us to link the knowledge acquired from individual projects to the existing know-how of our organization. As the duration of project is short compared to the development of our firm, it is important to reflect and document all our experiences and lessons learned in every project. Otherwise, it will not be able to come up with creative new ideas and the capability to improve our products/services for our customers. The approaches I use in handling all*

issues that I encounter in this pharmaceutical factory project that I am managing come from the knowledge I have accumulated from previous projects.

Satisfying customers requirements through establishing vertical linkages (C2) and reconfiguring value chain (C5) can be explained from three aspects. Firstly, foreign firms can focus on exerting or setting up its core competent in Chinese construction market through idiosyncratic yet complementary resources when they link up with other firms (Kogut, 1991). This will give firms the leverage to capitalize on the capabilities of other firms, which they themselves do not have. Secondly, linkages facilitate vertical information flow which leads to faster and more informed decision making to fulfill customer requirements. The increased knowledge gained through linkages also contributes to better quality products/services. Finally, firms that establish vertical linkages (C2) or reconfigure value chain (C5) are assumed to have mapped their current building process from a management perspective before adopting these two strategic practices. As stated by Lindfors (2000), these mapping activities have already proved useful in terms of quality control.

6.5.4.3 Risk responsiveness strategies to achieve competitive Y2

Figure 6.8 shows that all measurement items under risk responsiveness have significant correlations with Performance in public image (P6). Among these eight items, seven measurement items correlate with all three measurements under qualitative performance, except having responsive system to compensate for losses arising from unexpected events (A4). Though A4 only correlates with one measurement under Y2, i.e. public image (P6), both A4 and P6 have the highest factor loadings on their individual constructs, A4 should be seriously considered when firms achieve qualitative performance (Y2). A3, S1, S6 and MI4 have stronger correlations

with the measurement items of performance. At the same time, these stronger correlations happen between these four measurement items and client satisfaction (P5). Therefore, by adopting A3, S1, S6 and MI4, a firm may have more opportunities to achieve good performance in Y2.

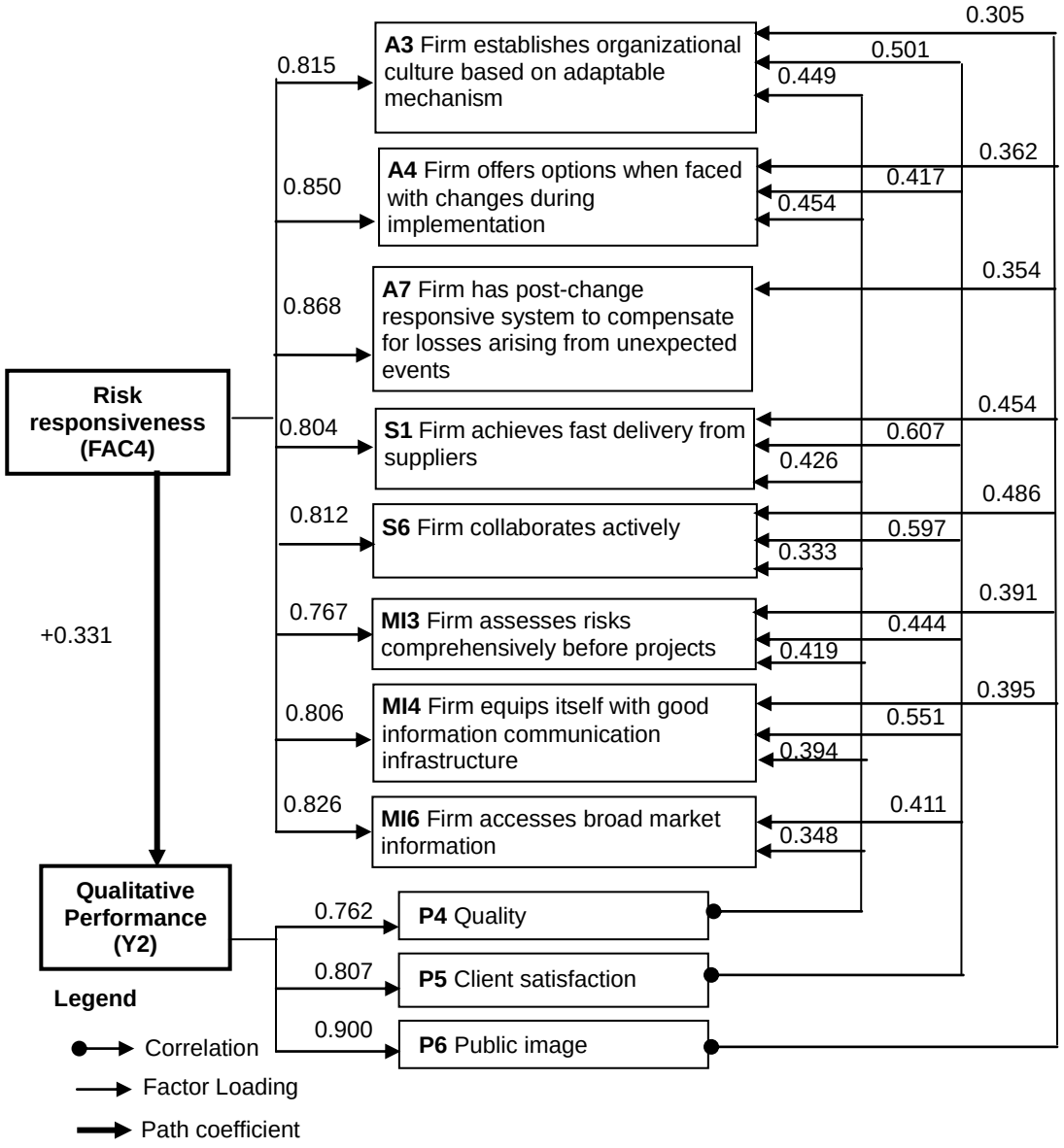


Figure 6.8 Relationships between Risk responsiveness and Y2

That establishing organizational culture based on adaptable mechanism (A3) contributes to qualitative performance is consistent with the finding by Ling et al. (2006) that it would be better for the foreign firm to adapt to the Chinese than the other way

around. Since foreigners should not assume that they know what clients want in China (Ling et al., 2006), the adaptability-based organizational culture is important in facing and living through changes (Alas and Sun, 2007).

Achieving fast delivery from suppliers (S1) and collaborating actively (S6) have significant correlation with customer satisfaction (P5). This shows that S1 and S6 make contributions to improve the performance in Y2 via increasing customer satisfaction. Since S1 and S6 are coming from Swiftness category, it is suggested that in Chinese construction market, customers will value speedy delivery of the project. Therefore, clients' preference for speedy delivery of the constructed facility creates opportunities for firms to emphasize their on-schedule performance (Kale and Arditi, 2003). This is also supported by one of the interviewees' perspective that:

> *It is very important for our firm to access good suppliers to assist our deliveries in the Chinese construction market. "Good" means the product/service has high quality as well as delivered speedily. This is more important in JVs to show our special competence by having strong support from local firms. During the JVs, to make local firms believe that our firm is different from other foreign firms, we emphasized on the synergy with local firms to maximize our mutual success. Active collaboration with local firms not only helps them to achieve high sales volume, but also give our firm opportunities to utilize local resources. This is the reason why we can always give excellent and innovative design ideas in design to our customers in a speedy manner.*

The importance of information communication infrastructure (MI4) can be explained by its role in providing a smooth process in project delivery.

6.5.4.4 Client-oriented swiftness (FAC6) strategies to achieve competitive Y2

Figure 6.9 shows a negative path coefficient between client-orientated swiftness and performance in Y2. The result shows that owning fast internal communication (S2), accommodating client's requests (S3) and encouraging employee participation in decision making (A5) may lead to decreased performance in product quality and customer satisfaction.

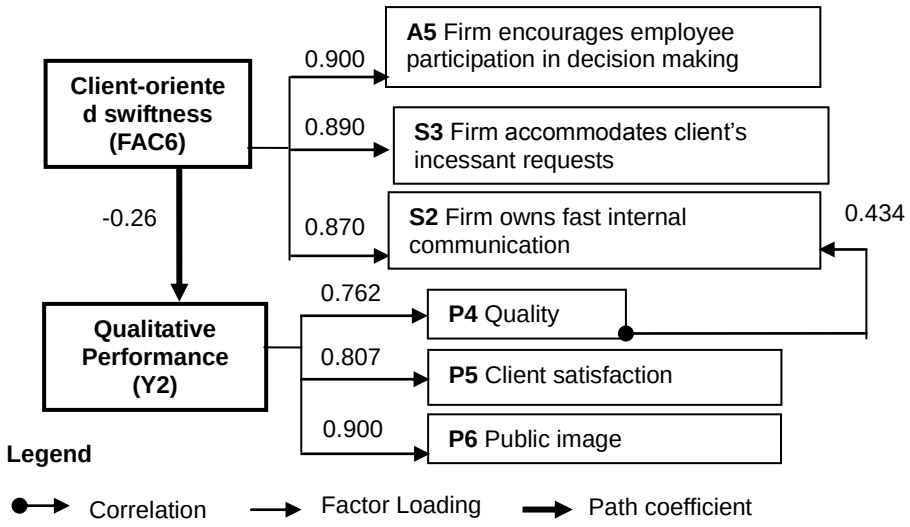


Figure 6.9 Relationships between Client-oriented swiftness and Y2

The negative effect may result from too narrow a focus on clients. Mbachu and Nkado (2006) found that the client's perspectives are usually subjective, which are based on his own perceptions rather than objective reality. Though clients try to satisfy the needs of shareholders, their project management practices are not always consistent with this (Bryde and Robinson, 2005). All these constitute dangers and risks for foreign firms who advocate the client-oriented swiftness strategy. Listening to, and acting only upon, client's stated needs may not yield the desired benefits (Goodacre et al., 1982). Since project environments are often characterized by a difference between what people think they should do and what they do in practice (Trevino and Weaver, 1999), foreign firms may need to shift from narrow client-oriented swiftness to a broad shareholder-oriented strategy. Foreign firms should be the nodes in the network rather

than only a supplier to one client.

Thus, it is possible that swiftly following the client's opinion may cause the project team to depart from objective reality. Without sufficient time for in-depth viability appraisal, clients usually adopt irrational approaches in making decisions concerning optimal solutions to their real needs. One of the interviewees shared his perspective:

> *"We entered into the Chinese construction market by following our client's steps. To gain a foothold there, we need to identify new inroads that will bring us new clients. Focusing on one or two clients is not our developing strategy in the Chinese construction market, in which diverse of clients are operating their businesses."*

At the same time, due to other pressures, such as commercial imperatives, some clients do not practice openness and trust in their dealings with other project shareholders (Chan et al., 2003). Therefore, a transformation of attitude to adopt relationship-management may be necessary for foreign firms to avoid politics and power struggles that are prevalent in many organizations (Mintzberg, 1998). The pattern of the relationship between the client and foreign firm may change from "C-F" to "C-N-F", where "C" represents "client", "F" represents "foreign firm", and "N" represents the "network" of other shareholders.

However, it is possible that the respondents were trying to shift blame for poor performance to the client rather than take responsibility for their own actions. Therefore, client-oriented swiftness did make positive contribution to achieve qualitative performance. This counter-intuitive result deserves a further study (see Section 8.8).

6.6 Summary

This chapter reports and discusses the research results.

The t-test results show that 44 practices are important to achieve critical strategies. These were used for subsequent statistical analysis.

When the inconsistent measurement items were removed following a set of rules (see section 5.7.3.6), the results of the validation test show the reliability and validity of the factors used in constructing the PSN model. In particular, the results have met the first objective of this study by identifying eight critical strategies that enable foreign firms to be competitive in China: differentiation factor (FAC1), focusing-training factor (FAC2), cost leadership factor (FAC3), risk responsiveness factor (FAC4), market-oriented swiftness factor (FAC5), client-oriented swiftness factor (FAC6), trust factor (FAC7) and resource factor (FAC8) (see section 6.4). At the same time, the results also show that a two-dimensional construct (i.e. Y1 Quantitative Performance and Y2 Qualitative Performance) may be used by foreign firms to evaluate competitive performance in the Chinese construction market.

To address the second objective of this study, the important practices to achieve the critical strategies are tested by confirmatory factor analysis. It is found that 37 practices are significantly important in achieving critical strategies.

This Chapter also developed the PSN model. The test results of PLS PSN show that there are two configurations of combined factors to achieve competitive performance. It is found that a firm's Y1, the cost leadership factor (FAC2) and market-oriented swiftness factor (FAC5) are found to have a positive effect on it, while the resource factor (FAC8) has a negative influence on it. As for Y2, it is positively influenced by the

differentiation factor (FAC1), cost leadership factor (FAC3), and risk responsiveness factor (FAC4). The client-oriented swiftness factor (FAC6) is found to have negative influence on firm's Y2. The next chapter presents the application and validation of the PLS PSN model.

CHAPTER 7 MODEL VALIDATION AND APPLICATION

7.1 Introduction

This chapter reports on the design validation and application of the PSN model constructed in Chapter 6. The design of the PSN model is first discussed in Section 7.2, followed by the approaches to test the model (Section 7.3) and findings concerning the practicality of the PSN model (Section 7.4). The application of the constructed structural model is described in Section 7.5.

7.2 Designing the PSN model

The final objective of this study is to develop and test a model to measure the competitiveness of foreign firms in China's construction market (see section 1.3). Two mathematical equations are developed from the PLS PSN model to predict quantitative performance (Y1) and qualitative performance (Y2).

7.2.1 Quantitative performance (Y1)

As discussed in Section 6.5.3, three critical strategies are statistically significant predictors of Y1. They are: (i) cost leadership (FAC3), (ii) market-oriented swiftness (FAC5), and (iii) resource-network (FAC8). From the SEM PLS, a model to predict a firm's competitive performance is obtained (see Eq. 7-1).

$$Y1 = 0.412(FAC3) + 0.350(FAC5) - 0.301(FAC8) \quad \text{Eq. 7-1}$$

Where:

Y1 = quantitative performance index of a foreign firm in China;

FAC3 = the construct score of a firm's cost leadership strategy;

FAC5 = the construct score of a firm's market-oriented swiftness;

FAC8 = the construct score of a firm's resource-network.

It can be seen from Eq. 7-1 that foreign firms' better performance in cost leadership (FAC3) and market-oriented swiftness (FAC5) will contribute to a higher score in Y1. However, resource-network (FAC8) has a negative influence on the performance in Y1. Hence, to improve their performance in Y1, foreign firms should not adopt the resource-network strategy (FAC8) too aggressively.

7.2.2 Qualitative performance (Y2)

Turning to a firm's competitive performance in Y2, Section 6.5.4 shows that the four statistically significant predictors are: (i) differentiation (FAC1), (ii) cost leadership (FAC3), (iii) risk responsiveness (FAC4), and (iv) client-oriented swiftness (FAC6). Based on the path coefficients (i.e. parameter estimates) (see Section 6.5.1.2) of these predictor constructs, a model for predicting a firm's competitiveness in Y2 is formulated in Eq. 7-2.

$$Y2 = 0.65(FAC1) + 0.338(FAC3) + 0.331(FAC4) – 0.26(FAC6) \quad \text{Eq. 7-2}$$

Where:

Y2= qualitative performance index of a foreign firm in China;

FAC1= the construct score of a firm's differentiation strategy;

FAC3= the construct score of a firm's cost leadership strategy;

FAC4= the construct score of a firm's risk responsiveness;

FAC6= the construct score of a firm's client-oriented swiftness.

From Eq. 7-2, it indicates that, on the one hand, the higher the constructs' scores for differentiation strategy (FAC1), cost leadership (FAC3) and risk responsiveness (FAC6), the greater the competitiveness in Y2. On the other hand, a foreign firm's aggressive implementation of client-oriented swiftness (FAC6) in delivering projects is seen to reduce the performance in Y2. The negative coefficient of FAC6 suggests a lower adoption in client-oriented swiftness will contribute to a higher competitive performance in Y2.

7.3 Validating the PSN model

7.3.1 Process of validation

After the models were constructed, they were tested using new sets of data. Based on the findings reported in Chapter 6, a new questionnaire was prepared (See Appendix B). This structured questionnaire is modified from the original questionnaire that was used in data collection by removing both the unimportant practices and inconsistent measurement items found there. The length of the questionnaire is thus shortened and interviews can be conducted more efficiently.

This questionnaire was sent out to six randomly selected foreign firms (F1 to F6) which did not participate in the questionnaire survey in the data collection process. The reason for choosing six experts is inspired by Atkinson's (1984) triangulation concept. The triangulation concept states that information about a single phenomenon should be collected from at least three different sources, or at least information should be obtained from three different techniques, because the validity of the information will be doubted and reduced when it comes from only one expert. In the validation survey,

experts were required to: (i) comment on the practicality and comprehensiveness of the constructed structure model, and (ii) complete a set of questionnaire. The profiles of these six foreign firms are show in Table 7.1.

Table 7.1 Profiles of the six foreign firms used to validate the models

Description	Data
Business undertaken by headquarters	**Number**
Architectural consultancy	6
Civil engineering	4
M&E consultancy	4
Management	6
Location of headquarters	**Number**
France	1
Germany	1
UK	2
USA	2
Average Size of workforce in China (approximate)	120
Average Size of workforce worldwide (approximate)	7680
Number of years firm has operated in China (average)	8.7
Location of projects in China	Number
Beijing	6
Shanghai	5
Tianjin	3
Chengdu	4
Shenzhen	2
Types of facilities involved in China	**Number**
General building	6
Industrial	2
Water	2
Business in China	**Number**
Design consultancy (architectural and civil engineering)	6
City/town planning	3
M&E consultancy	4
Management	6
The way firm is selected to provide the services in China	**Number**
Open competitive bidding	3
Selective bidding/prequalification	6
Negotiation	4
Designation of respondents	**Number**
Director (managing director, executive director)	4
General manager	1
Senior manager (assistant general manager, senior project manager)	1
Number of years respondents have practiced in China (average)	11.5

It can be seen from Table 7.1 that the six foreign firms invited to validate the models have headquarters in the US, UK, Germany and France. The headquarters of these six foreign firms had business in architectural consultancy and management. Four of them had business in civil engineering and M & E consultancy. This is consistent with the business they provided in Chinese construction market. Table 7.1 shows that all the six foreign firms provide design and management services. The average workforce in China is approximately 120. These foreign firms had working experience in China for an average of 8.7 years. Their projects in China cover five cities: Beijing, Shanghai, Tianjin, Chengdu and Shenzhen, and all these six foreign firms had projects in Beijing. Their services provided in China are mainly General buildings.

Turing to the profile of the six respondents, four of them are directors. The other two are senior manager and general manager. They had experience in the Chinese construction market for 11.5 years on average. Their designations are appropriate to give reliable and practical information, and their experiences in China ensure that they are appropriate to answer the questions relative to Chinese construction market.

7.3.2 Robustness of the model

The data collected from the validation process was used to test the PSN model. Using Eq. 7-1 and Eq.7-2, Y1 and Y2 were predicted by calculating new data collected from the six firms. The calculated Y1 and Y2 were compared to actual data supplied by the 6 firms.

To achieve predicted and actual Y1 and Y2 performance, weights (as shown in Table 7.2) for individual measurement items of respective constructs were used.

Table 7.2 Weights for respective constructs

Constructs	Measurement item codes	Weights (ω_ξ)
Differentiation (FAC1)	D1	0.095
	D2	0.133
	D3	0.209
	D4	0.172
	D5	0.223
	D6	0.167
Cost leadership (FAC3)	C1	0.245
	C2	0.251
	C5	0.287
	C6	0.217
Risk responsiveness (FAC4)	A3	0.116
	A4	0.109
	A7	0.101
	S1	0.175
	S6	0.121
	MI3	0.116
	MI4	0.122
	MI6	0.169
Market-oriented swiftness (FAC 5)	A1	0.275
	A2	0.307
	S4	0.207
	S5	0.210
Client-oriented swiftness (FAC6)	S3	0.335
	S2	0.309
	A5	0.356
Resource network (FAC8)	N4	0.280
	N9	0.271
	N13	0.273
	N16	0.176
Quantitative performance (Y1)	P1	0.260
	P2	0.409
	P3	0.330
Qualitative performance (Y2)	P4	0.380
	P5	0.325
	P6	0.295

Table 7.2 shows the outer model weights for individual measurement items of respective constructs. The process to test the robustness of the PSN model involves the following:

1. Actual scores (AS) of performance in Y1 and Y2

Respondents' ratings of their firms' attributes of competitive performance (P1 to P6) (see section 6.4.2) were used to compute the actual scores of Y1 and Y2. The rating assigned to each performance attributes was multiplied by the respective weight shown in Table 7.2 to achieve the composite scores for Y1 and Y2. These are

presented in Table 7.3 col.3.

2. Predicted scores (PS) of performance in Y1 and Y2

Predicted scores of Y1 and Y2 were calculated by using Eq. 7-1 and Eq.7-2. The composite scores of respective constructs corresponding to Y1 and Y2 were calculated by using the ratings and weights assigned to the measurement items of various constructs. These scores were subsequently input into Eq.7-1 and Eq.7-2 to calculate the predicted overall scores of Y1and Y2. These are shown in Table 7.3 col. 4.

3. Normalized actual scores (NAS) and normalized predicted scores (NPS) of performance in Y1 and Y2

The actual scores and predicted scores achieved from step 1 and step 2 are normalized into the same scale, which is from 0 to 1, to make them comparable. The normalized actual scores and normalized predicted scores are shown Table 7.3 col.5 and col.6 respectively.

4. Robustness of PSN model

To determine the robustness of the PSN model, percentage error (PE), mean percentage error (MPE) and mean absolute percentage error (MAPE) (adopted from Upton and Cook, 2006) were calculated.

Percentage error (PE) (Eq. 7-3) is used to measure the errors between the actual and predicted competitiveness of respective performance dimensions.

Percentage error (PE) =(Actual score-Predicted score)/Actual score x100%

Eq.7-3

Mean percentage error (MPE) (Eq. 7-4) is the average of all percentage errors (PE).

$$\text{Mean percentage error (MPE)} = \frac{\sum \mathbf{PE}}{\mathbf{n}} \qquad \text{Eq.7-4}$$

Where n=number of predictions.

The third measurement is mean absolute percentage error (MAPE) (Eq.7-5). It is achieved by adding all percentage errors (PE) using their absolute values, and then dividing the sum by the number of observations.

$$\text{Mean absolute percentage error (MAPE)} = \frac{\sum[\,|\,\mathbf{PE}\,|\,]}{\mathbf{n}} \qquad \text{Eq.7-5}$$

The results in Table 7.3 show that the percentage errors obtained for the two models range from -3% to 32%. Table 7.3 shows that the Y2 model is able to predict the actual score more accurately than Y1 as it has lower MPE and MAPE, indicating that the predicted scores of Y2 are relatively closer to actual scores.

Table 7.3 Comparison of actual and predicted scores

Performance	Firm	Actual Score	Predicted Score	Normalized Actual Score	Normalized Predicted Score	PE%	MPE %	MAPE %
Quantitative performance Y1	F1	5.41	2.58	0.75	0.61	18%	14.83 %	18.17 %
	F2	4.81	3.09	0.64	0.70	-10%		
	F3	6.21	2.45	0.87	0.60	32%		
	F4	5.99	3.42	0.83	0.75	10%		
	F5	6.99	3.31	0.99	0.73	27%		
	F6	5.06	2.46	0.68	0.60	12%		
Qualitative performance Y2	F1	6.00	6.25	0.83	0.71	14%	12.83 %	12.84 %
	F2	6.62	6.48	0.94	0.74	21%		
	F3	6.38	7.02	0.90	0.79	12%		
	F4	5.76	6.05	0.79	0.69	13%		
	F5	7.00	7.09	1	0.80	20%		
	F6	4.41	5.07	0.57	0.59	-3%		

The test results in Table 7.3 suggest that the mathematical models of Y1 and Y2 are

relatively robust in predicting a foreign firm's competitive performance in the Chinese construction market. Eq.7-1 and Eq.7-2 provide valuable insights into the coexistence and combined effect of different strategies in pursuing different dimensions of performance. Furthermore, the coefficient associated with each construct provides a useful guide for foreign firms to decide the extent of resources and capabilities to be committed.

7.4 Experts' views on the PSN model

This section reports the six experts' perspectives on the PSN model and their views on the information about the comprehensiveness of this model in the Chinese construction market.

During the interviews at the validation stage, the results relating to the components and the relationships between components of the PSN model were introduced to six experts, after they had rated the important practices in the questionnaire. They were requested to comment on both the structures of the PSN model and its practicality.

7.4.1 Structures of the PSN model

The responses of the six experts show they generally agree with the two-dimensional approach (Y1 and Y2) to evaluate a firm's performance in achieving competiveness. The experts were also of the opinion that the six attributes (P1 to P6) to explain individual dimensions of competitiveness (Y1 and Y2) are pertinent to assess a foreign firm's competitiveness in the Chinese construction market. Four experts stated that the attributes consisting of client's satisfaction, public image and product quality is more important than the dimension focusing on the number of projects, value of projects and profitability. One of the experts explained that:

When a foreign firm operates outside its home country, the most important consideration is the reputation of the quality of its products/services as perceived by its clients and customers. If we cannot make ourselves known to our customers in this new market, we cannot move even one step toward achieving bigger dreams. Creating a deep and good impression in our customers' minds is really a long-term process. We contributed less to our organization's revenue in the first five years after we entered the Chinese market, but the information we have managed to transfer to the public about our products is worth it. The resources to support our expanding business in the Chinese construction market are accumulated during these five years. Therefore, the reputation that we succeed in building for ourselves in the Chinese construction market in the early stage is a vital part of our performance.

Two other experts proposed that a firm's performance in generating profit should be the most important consideration in evaluating its competitiveness. One of them explained that:

Although the other measurements are necessary, profitability and the number of projects are the most vital goals for a firm to pursue. Without outstanding profits, our unit in China will be the weakest among all the subsidiaries in our organization. Besides, the greater the number of projects we manage, the more knowledge and information we are able to acquire and transfer to our organization. This is an important strategy in raising our subsidiary's standing within our organization. Our public image and client's satisfaction in the form of acceptance by the public and our customers is less important since the Chinese market, the dynamic international competition, is the most serious hindrance to our growth.

These two different perspectives show that the different components which are used to explain the two dimensions of competitive performance are both important. Although there are differences between the two views, the similarity is that both consider the contributory role of the subsidiary to the organization. Whether the focus should be on Y1 or Y2 can be explained from two perspectives. Firstly, the firms with a long-term plan to operate in the Chinese construction market will subscribe to a different way of evaluating success and competitive performance, compared to those firms which only look upon the Chinese construction market as a second choice for their organization's global development. From this perspective, it is the development strategy of the whole organization that determines the behaviour or business strategy of its subsidiary. Secondly, the difference between them may arise because the firms are considering different evolutionary stages in the Chinese construction market. In the early stage of development in the Chinese construction market, some firms may channel more efforts into marketing related issues.

The six experts held similar views on the relationships between strategies and performance. In particular, in pursuing competitive performance in Y2, all the experts emphasized the combined effect of differentiation and cost leadership on performance. One expert, using his own firm as an example, explained that:

> *It is reasonable to suggest that in the quest to differentiate ourselves from others, the cost of this differentiation should be controlled. For example, in my firm, the initial intention to keep more linkages with suppliers was to reduce our cost in switching suppliers and increase our bargaining power with them as much as possible. Gradually, we realized that the products of two suppliers can help us to achieve a high quality and differentiation outcome. With repeated use, economies*

of scale allow the costs to be reduced. This enabled us to achieve differentiation and cost leadership simultaneously.

In pursuing good performance in Y2, the experts shared that “risk responsiveness” is considered vital. They emphasized that risk responsiveness is necessary to facilitate the implementation of differentiation. Besides confirming the presence of risk responsiveness in the composition of Y2, the experts’ response is also consistent with the parameter estimation of this research. One expert explained that:

Based on our experiences in the Chinese construction market, risk responsiveness is as a strong weapon that facilitates the implementation of other strategies. In the initial stage of our operations in China, we regarded it as the most vital strategy. However, it should be noted that it can create negative effects if it is not handled in a judicious manner. Too much caution will result in indecision, which will cause serious consequences to the venture in the Chinese construction market.

All the experts agreed that in pursuing performance in Y2, differentiation, cost leadership, and risk responsiveness are relevant. They also felt that client-oriented swiftness may have a negative impact on Y2. The reason for this negative effect may be found in the attitudes and views held by clients where a particular project is concerned, which may not be consistent with the real situation from a professional perspective. This is especially so when the client is the official government of the host country, which is often the case, where inducement rather than strictly following the client’s ideas leads to successful performance.

Turning to the formulation to achieve performance in Y1, the response from the experts

focused more on the role of “resource factor”. They share the same opinion that “resource factor” may have a negative effect on achieving good performance in Y1 thereby confirming Eq. 7-1. They agreed that “cost leadership” and “market-oriented swiftness” contribute to good Y1 performance. One expert explained that:

> *“Resource factor” defined by those measurement items is important in completing a project. When it comes to making a good profit, the situation may be different. The high value created by all partners does not mean we will achieve higher profits. Without strong bargaining power, at least in our current situation, it is impossible to increase our profits by depending on our relationships with partners. Too many interactions between partners to share resources, especially knowledge resources, may bring serious consequence to us. On the contrary, we need to protect our own resources and prevent them from being “grabbed” by local Chinese firms, since they are really very fast in learning and imitating.*

The expert’s view supports the finding that too much dependence on resource-network (FAC8) brings negative effects on quantitative performance. Sharing knowledge with other firms who are embedded in the network may not help foreign firms to achieve more benefits, but provides chances for local firms to acquire more knowledge. ‘Grabbing’ knowledge, especially the one only owned by foreign firms, will lead local Chinese firms to be more independent, thus increasing their bargaining power in the network.

7.4.2 Practicality and comprehensiveness of the PSN model

The experts’ assessment of the practicality of this PSN model was positive. They said that the conciseness and definitude of the model in particular impressed them deeply.

They shared the view that the two configurations of combined factors and the effects of diverse strategies are useful to them. One expert said that:

> *The two configurations help us to better understand our own situation in this market. The most important thing is that we are able to get some idea of what other players in the market are doing after making a quick evaluation using the information provided by the PSN model. Referring to the index of each strategy in the two configurations, I know the dimension of competitive performance from self assessment. At the same time, by evaluating other firms' performances, the important strategies utilized by these firms were known. All this enabled me to know my own situation in market by comparing with and analyzing the situations of other firms.*

The experts also mentioned that they would use the model if given the opportunity as it is user friendly and does not require input of complicated information. One expert shared that:

> *As a senior manager, I really do not want to consider a long list of common sense items. The PSN model is useful because it identify only the most important practices and the most critical factors for considerations in decision making. Only the statistically important strategies, with satisfactory predictive power, and the practices showing statistical importance are collected in these two checklists. I can identify the most critical strategy and most important practice referring the number of the index/weight.*

Where the comprehensiveness of the PSN model is concerned, the experts agreed that, to a great extent, this model has identified the important practices to construct

diverse strategies linked to competitive performance. However, they came up with two suggestions to improve the model:

(i) Three experts pointed out that the model should consider the number of years a foreign firm has operated in the Chinese construction market as an influential factor in the firm's strategy.

(ii) One expert stated that the model should provide the real size of firms under each configuration of the PSN model.

With regard to the first suggestion, it is possible that the number of years of experience a foreign firm has in China will influence the results of its performance, since this is supported by many academic researches. In this aspect, the year 2001 is considered a milestone in the history of foreign firms operating in China. It is only after China became a member of WTO in 2001 that foreign firms began expanding their business in the Chinese construction market. Therefore, in this research it may be inappropriate to divide this short history of about ten years into several periods.

Where the second suggestion is concerned, it is possible to get categories by using cluster analysis in statistics. However, considering the small sample size of this research, the results may be not generalized.

Both of suggestions may be considered for future research.

7.5 Application of the PSN model

In this study, the structural PSN model constructed may be used as a self-assessment tool by foreign firms to estimate their level of competitiveness in China. Foreign firms will learn about the relationships between important practices and critical strategies,

and the paths from the various strategies to achieve competitive performance. Two checklists (see Figure 7.1 and Figure 7.2 for assessing Y1 and Y2 respectively) are prepared for foreign firms to confirm and adjust their practices to achieve competitiveness in the Chinese construction market, as well as their special capabilities in strategy implementation. From these checklists, foreign firms will glean information in four aspects: (i) features of competitive performance, (ii) critical strategies to achieve competitive performnace, (iii) important practices to achieve strategies, and (iv) influences between important practices and features of performance.

The process to assess Y1 is similar to Y2, except that the variables are different. For briefly, an explanation on how to assess Y2 is given below.

Figure 7.2 shows the checklists for foreign firms to achieve good qualitative performance in Y2, comprising achieving high product/service quality (P4), achieving high client satisfaction (P5) and competitive in achieving good public image (P6).

The critical strategies leading to high performance in Y2 are shown in Figure 7.2: differentiation (FAC1), cost leadership (FAC3), risk responsiveness (FAC4) and client-oriented swiftness (FAC6). The four arrows directing to the Y2 box show the path from strategy to performance. The respective path coefficients of individual paths are shown. Each of these four critical strategy boxes contains important practices to achieve the respective strategy. Practices are arranged by their weights (w), from high to low. When the extent to which each practice is implemented is adjusted, there would be corresponding adjustment to the competitiveness performance through equation 7-2.

To calculate Y2, the foreign firm should rate the extent to which it implements (or will implement) each important practice shown in Figure 7.2 on a 7-point scale, where 1=does not implement and 7=implement to a great extent. Each rating is then multiplied by the weight shown on Figure 7.2 to obtain a score. The scores for all the important practices are summed up within each critical strategy and input into Eq. 7-2. Thereafter, using Eq. 7-2, the overall competitiveness performance score (Y2) is calculated. Besides knowing the overall Y2 score, the individual scores at the important practice level can also inform managers. Managers can make comparisons by referring to the path coefficients provided and realize that differentiation (FAC1) with the highest path coefficient (0.650) is the most important factor. However, based on the actual situation of his firm, a manager may notice that cost leadership (FAC3) should be emphasized as his firm is already good at differentiation and has always paid attention to risk assessment and fast responses. The important practices under cost leadership will give him a hint that reconfiguration of his firm's value chain (C5) will contribute much to improving performance in cost leadership. Concurrently, the self-assessment done by this manager will confirm that his firm needs to direct greater effort at C5, since the rating of C5 is really low in the whole self-assessment exercise. Therefore, he will realize that as an assisting force to achieve strength in differentiation and risk responsiveness, C5 should be emphasized as well to achieve good performance in Y2.

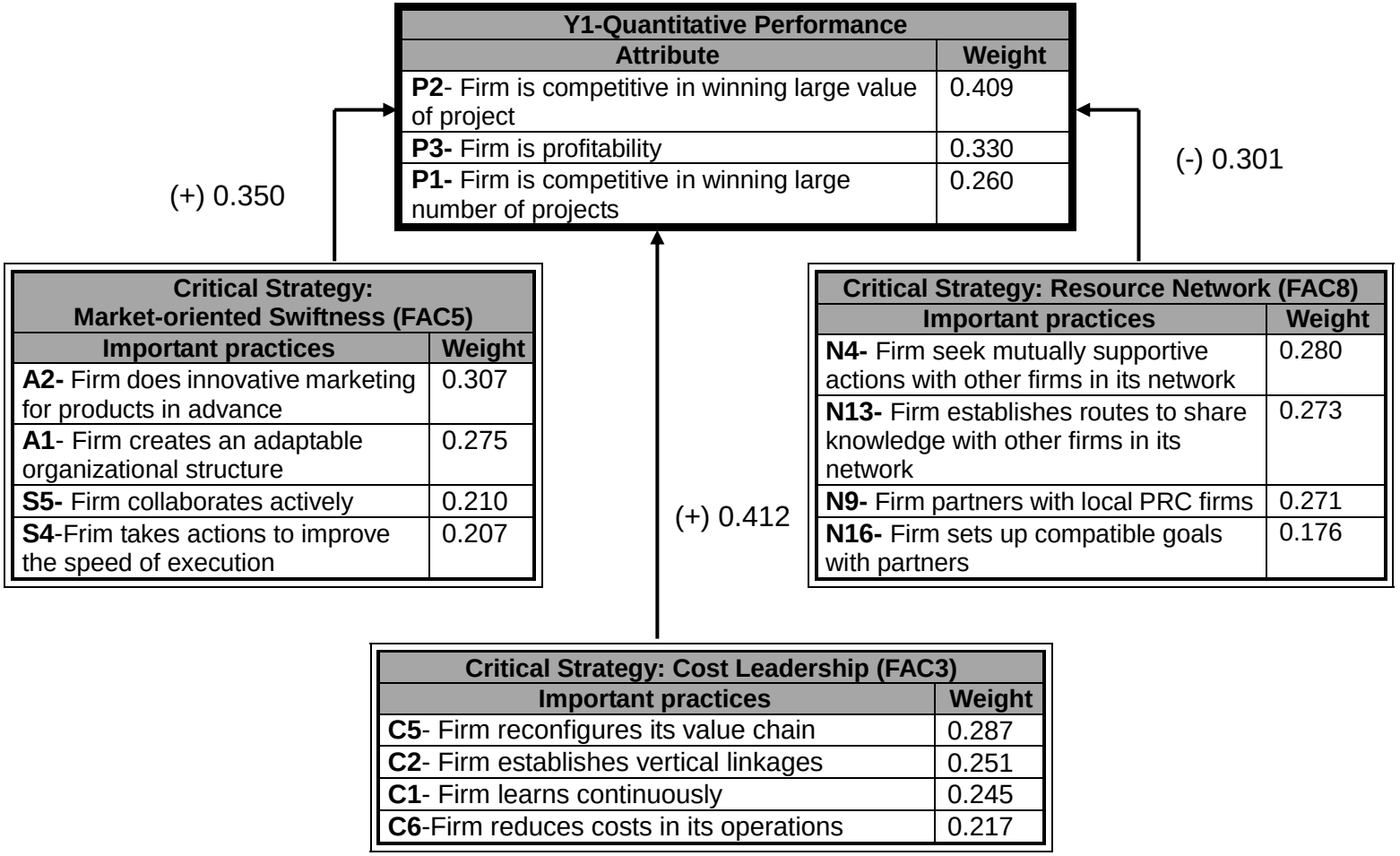


Figure 7.1 Checklist of the important practices and critical strategies to achieve quantitative performance

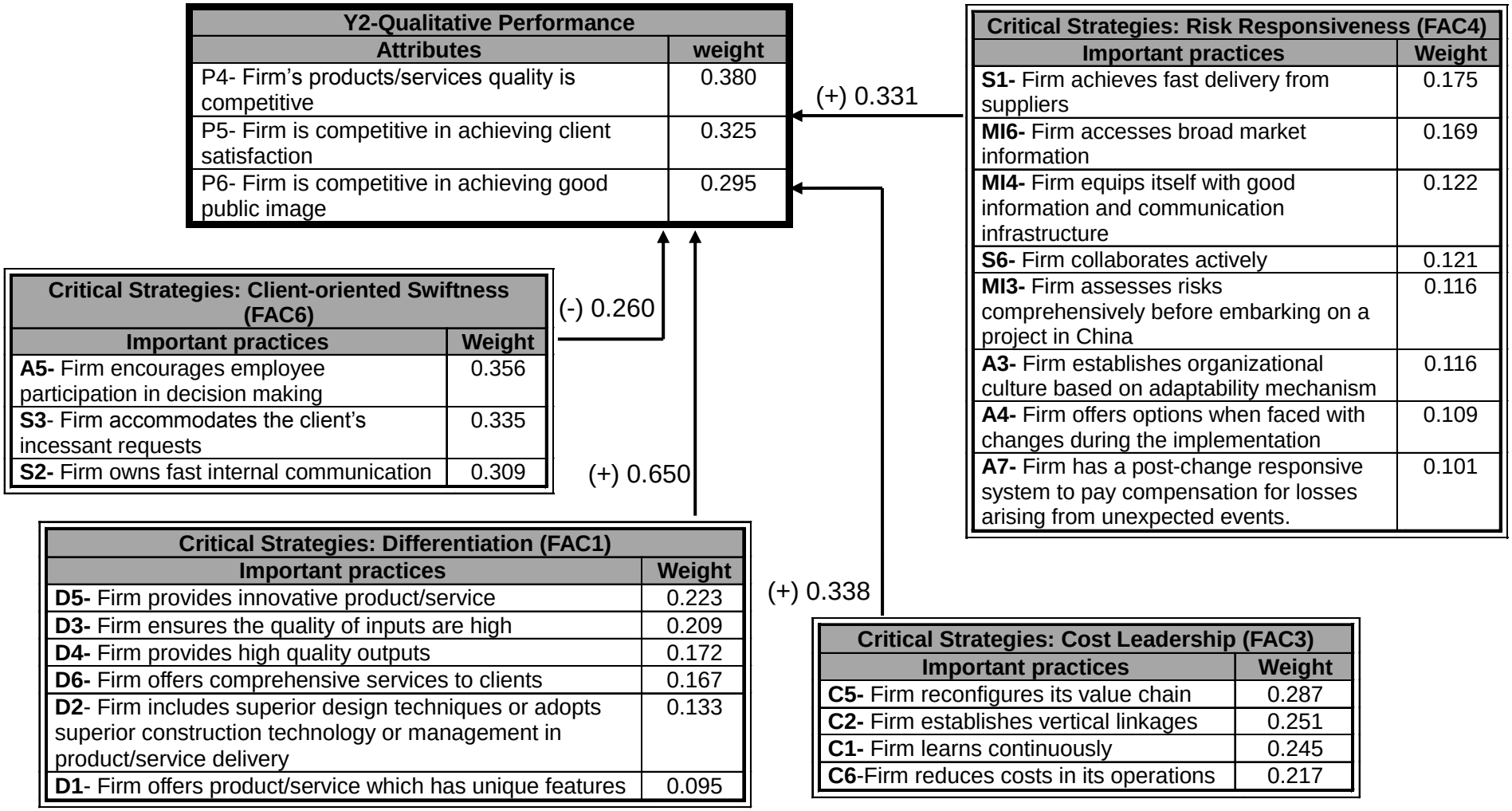


Figure 7.2 Checklist of the important practices and critical strategies to achieve qualitative performance

7.6 Summary

In this chapter, the models to predict a foreign firm's performance in Y1 and Y2 are developed. Six new sets of data were collected test the robustness of these two models. In the test for robustness, three equations were adopted: percentage error, mean percentage error and mean absolute percentage error.

The results show that equations to predict performance in Y1 and Y2 are relatively robust, with respective mean absolute percentage errors at 14.83% and 12.83%. Compared to Y2, the larger positive percentage error of Y1 implies that Y1 underestimates the performance of foreign firms to a larger extent than Y2. Y2 has three sources of positive forces leading to increases in performance whereas Y1 has only two positive forces to counteract the consequences resulting from negative factors. In addition to the number of positive and negative predictors in the two equations, the relative ratio of positive predictors to negative predictors in Y1 is less than that in Y2. This suggests that improving performance in Y1 is more difficult than achieving similar improvements in Y2.

The experts are also of the opinion that the PSN model is comprehensive. The definitude and directness of both the contents of components and the relationships between components of the PSN model make it a practical and easy-to-use tool for self-assessment. A summary and the conclusions of this study are presented in the next chapter.

CHAPTER 8 SUMMARY AND CONCLUSIONS

8.1 Summary

With China becoming a member of the World Trade Organization (WTO) and developing her construction industry, strategies and approaches are being identified to help foreign operators achieve better performance in the Chinese construction market. Previous construction-related studies have set up some kind of models underpinned by Western management concepts to help foreign firms to operate in the Chinese construction market. However, no study has hitherto developed a united approach by combining Porter's generic strategy, Sun Tzu's military strategy and social network strategy to help foreign construction related consultancy firms achieve competitiveness in China.

Based on the concepts of competition and strategic approaches of Western origin, and the cultural approaches and strategic management principles of Chinese origin, the framework to enhance the competitive performance of foreign firms is established for this study by combining Porter's generic strategies, dialectical principles from Sun Tzu's Art of War and the Network Theory of Embeddedness (see Chapter 2 and Chapter 3).

A conceptual framework for foreign firms to attain competitiveness in China has been set up (see Figure 4.1). It is underpinned by three concepts: Porter's generic strategies (see Section 3.2); Sun Tzu's dialectical military strategies (see Section 3.4); and Network strategy (see

Section 3.5). The Porter-Sun Tzu-Network (PSN) framework postulates that foreign firms may enhance their performance in the Chinese construction market by adopting particular strategies in their strategic planning and their planned execution, as well as strategies to be embedded in their networks. The strategies that make up the PSN framework are: cost leadership; differentiation; focus; swiftness; adaptability; market intelligence; and network (see section 3.6).

To fulfill the objectives, this study adopted a survey research design (see Section 5.3). The data collection instrument used was a questionnaire (see Appendix A). Data were collected via email, and supplemented by face-to-face interviews. The Smart PLS2.0 M3 statistical software was used for analyzing the data using the Partial Least Square (PLS) approach (see Section 5.7). A second survey was conducted to collect new sets of data for model validation (see Section 7.3.1).

8.2 Summary of findings and validation of the hypothesis

This section summarizes the findings of this study and validates the research hypothesis.

8.2.1 Critical strategies to attain competitive performance

The first objective of this research is to identify the critical strategies to enhance competitive performance (see section 1.3). First, the Porter-Sun Tzu-Network (PSN) conceptual

framework (see Figure 4.1) was specified by exploratory factor analysis (EFA) and confirmed by confirmatory factor analysis (CFA) (see section 6.4.4). From the EFA, eight critical strategies adopted by foreign firms to attain competitiveness in China are found to be:

- differentiation (FAC1),
- focus-training (FAC2),
- cost leadership (FAC3),
- risk responsiveness (FAC4),
- market-oriented swiftness (FAC5),
- client-oriented swiftness (FAC6),
- trust network (FAC7),
- resource network (FAC8).

Competitive performance in this study is measured by seven variables. They are: number of projects won in China; value of projects won in China; profitability; quality of the products/services; customer satisfaction; foreign firm's public image; and speed of project delivery. Using EFA, competitive performance is categorized into two dimensions:

- quantitative competitive performance (Y1) comprising quality output (P4), client's satisfaction (P5) and public image (P6)
- qualitative competitive performance (Y2) comprising number of projects (P1), value of projects (P2) and profitability (P3).

Turning to the path coefficients that describe the relationships among the constructs in the

PSN model, the results show that there are seven significant paths supporting the relationships among the constructs (see Section 6.5.1.2). Of these, three predictor constructs significantly influence the quantitative performance (Y1) of firms. Among them, two are positive path coefficients and one is a negative path coefficient. The positive impacts are cost leadership (FAC3) (β=0.412) and market-oriented swiftness (FAC5) (β=0.350). This suggests that to enhance its performance in the quantitative dimension, a foreign firm should adopt the cost leadership and market-oriented swiftness strategies. At the same time, the magnitude of cost leadership is relatively higher, which means cost leadership plays a more important role in achieving quantitative performance than market-oriented swiftness strategy. The negative path coefficient that has a negative impact on quantitative performance is from resource network (FAC8) (β=0.301).

With regard to a firm's performance in the qualitative dimension (Y2), there are four predictor constructs with statistically significant impact (see section 6.5.4). They are differentiation (FAC1), cost leadership (FAC3), risk responsiveness (FAC4) and client-oriented swiftness (FAC6). The three predictors with positive impact are differentiation (FAC1) (β=0.650), cost leadership (FAC3) (β=0.338) and risk responsiveness (FAC4) (β=0.331). On the contrary, client-oriented swiftness (FAC6) (β=0.260) works as a negative impact. The findings suggest that to enhance their performance in the qualitative dimension, foreign firms should adopt the strategies of differentiation, cost leadership and risk responsiveness, but should be careful about adopting the client-oriented swiftness strategy.

Based on these findings, the first objective of this research is achieved. The critical strategies for foreign firms to enhance competitiveness in China are: differentiation (FAC1), cost leadership (FAC3), risk responsiveness (FAC4), market-oriented swiftness (FAC5), client-oriented swiftness (FAC6) and resource network (FAC8). It is found that cost leadership (FAC3) has statistically significant impact on both dimensions of competitive performance.

8.2.2 Important practices to achieve critical strategies

The second objective of this research is to identify the important practices to achieve critical strategies. The practices that were operationalized from the seven critical strategies (see Section 4.2 to Section 4.8) were subjected to the t-test. The results show that 44 practices were significantly adopted by foreign firms operating in the Chinese construction market (see Section 6.3).

After the t-test, important practices to achieve corresponding critical strategies were identified via EFA and CFA. Following certain statistical rules (see Section 5.7.3.6), those practices that did not show reliability and uniqueness to establish corresponding critical strategies were eliminated, and 37 important practices to achieve critical strategies were identified (see Section 6.4.3).

To achieve the critical strategies underlying Porter's generic strategies, 13 important practices explain FAC1, FAC2 and FAC3 significantly (see Section 6.4.1.1). To achieve differentiation

(FAC1), the study found that foreign firms need to adopt six important practices: provide high quality outputs (D4), ensure the high quality of inputs (D3), offer product/service with unique features (D1), include superior design techniques or management in product delivery (D2), offer comprehensive services to clients (D6) and provide innovative product/service (D5). To achieve the focus-training (FAC2) strategy, important practices that a foreign firm should adopt are: offer a focused range of products/services (F4), operate in a specific construction market segment (F2) and provide staff training (C9). The four practices that are important for achieving cost leadership (FAC3) strategy are: reduce costs in operation (C6), establish vertical linkages (C2), reconfigure firm's value chain (C5) and learn continuously (C1).

With regard to the critical strategies under Sun Tzu's military strategies, 15 important practices are needed to explain FAC4, FAC5 and FAC6 (see Section 6.4.1.2). In particular, eight important practices are necessary to achieve the risk responsiveness (FAC4) strategy: assess risks comprehensively before embarking on a project in China (MI3), offer options when faced with changes during implementation (A4), access broad market information (MI6), have suppliers who provide fast delivery (S1), establish an organizational culture based on adaptability mechanism (A3), equip firm with good information and communication infrastructure (MI4), have a post-change responsive system to compensate for losses arising from unexpected events (A7) and collaborate actively (S6). The four practices that are important for achieving market-oriented swiftness (FAC5) strategy are: innovate product/service continuously (S5), take action to improve the speed of execution (S5), do

innovative marketing in advance (A2) and create an adaptable organization structure (A1). Client-oriented swiftness (FAC6) strategy is achieved through three practices, but these should be used sparingly as the study found that this strategy brings a negative effect on competitiveness. Among the 15 important practices under Sun Tzu's strategy, the three most important practices are to accommodate the client's incessant requests (S3), have fast internal communication (S2) and encourage employee participation in decision making (A5).

Turning to the 11 competitive practices under the network strategy, nine are found to be important for foreign firms to achieve FAC7 and FAC8 (see section 6.4.1.3). To achieve the trust network (FAC7) strategy, foreign firms are required to adopt five important practices: encourage communication of information across hierarchies (N11), establish mutual trust with other firms in their network (N1), resolve conflict effectively (N3), have long-term commitment with other firms (N2) and set up compatible goals with partners (N18). The four important practices to achieve the resource network (FAC8) strategy are: seek mutually supportive actions (N4), set up network proactively (N16), establish routes to share knowledge (N13) and partner with local PRC firms (N9).

With the identification of the 37 important practices to achieve critical strategies for attaining competitiveness, the second objective of this study is achieved.

8.2.3 Model to enhance competitive performance

The final objective of this research is to design and test a model to explain competitiveness of foreign firms operating in the Chinese construction market. Based on the data collected, the PSN model was confirmed via the PLS process (see section 6.5.1). In addition, two competitive performance dimensions, Y1 and Y2 (predicted constructs), and eight critical strategies, FAC1 to FAC8 (predictor constructs,) were confirmed via PLS. Following a model trimming process to remove the redundant predictors for the respective predicted constructs, the R^2 values for quantitative performance and qualitative performance indicate that 40.1% and 68.2% of their corresponding variance can be explained by two patterns of combined critical predictors (see Section 6.5.1.1). After subjecting the data to PLS, the resultant PSN model is obtained (see Figure 6.1).

Two mathematical models were also developed from the PSN model: (i) Eq. 7-1 for quantitative performance (Y1) (see Section 7.2.1), and (ii) Eq. 7-2 for qualitative performance (Y2) (see Section 7.2.2). These equations were tested with new sets of data collected from six firms to assess the robustness of the models (see Section 7.3.2). The results show that models Y1 and Y2 are generally robust in predicting a firm's competitive performance. The successful development, testing and validation of the PSN model suggest that objective three is also achieved.

8.2.4. Validation of the hypothesis

The hypothesis of this research as stated in section 3.6 is:

> A combination of cost leadership, differentiation, focus, swiftness, adaptability, market intelligence and network strategies can help foreign firms to achieve a higher level of competitiveness in China (see section 3.6).

The results show that to achieve either quantitative performance (Y1) or qualitative performance (Y2), foreign firms are required to adopt a combination of strategies (see section 6.2).

To achieve a higher level of competitiveness in quantitative aspect (Y1), foreign firms should combine cost leadership (FAC3) and market-oriented swiftness (FAC5), but should be careful in adopting resource factor (FAC8). To achieve a higher level of competitiveness in qualitative area (Y2), a combination of differentiation (FAC1), cost leadership (FAC3) and risk responsiveness (FAC4) should be adopted. Concurrently, client-oriented strategy (FAC6) should be implemented cautiously. The findings therefore validate the hypothesis that to be competitive in China, foreign firms need to adopt a combination of different strategies.

8.3 Recommendations

Based on the findings, several recommendations are made below.

8.3.1 Recommendations to foreign firms

With the successful development and testing of the PSN model, it is recommended that foreign firms use the model to help them check their competitiveness, and from there identify the appropriate approaches to enhance their competitiveness in China.

It is recommended that foreign firms whose intention is to grow their reputation and image in the Chinese construction market should provide distinctive products/services and concurrently be capable of controlling costs. The superior product/service which is priced competitively would then be able to satisfy the demands of customers in the Chinese construction market. In addition, there is a high calling of being able to achieve both differentiation and cost leadership. Some of the ways to achieve this include being familiar with the market before entering China, being proactive and prepared to deal with changes in the market, and having the capability to restore their competitive advantage despite changes in the environment.

It is also recommended that foreign firms offer a focused range of products/services in a specific construction market segment, and not to expand hastily in China. It is recommended that foreign firms proceed step by step instead of rush headlong because market-oriented swiftness is an aggressive and dangerous approach, especially for foreign firms which have just entered the market or only operated for a short time in the market. By developing gradually, they have time to establish their reputations as well as collect knowledge about the local environment. These will help to propel them towards higher competitiveness in China.

Foreign firms should have long-term strategic goals in the Chinese construction market. Following a home country client's move is a good way to enter this new market; however, too much dependence on a home country client will lead to negative effects. It is recommended that foreign firms take their home country clients as only one of the channels to deliver their business into this new market, instead of relying solely on home country clients to offer them projects in China. By having a portfolio of clients, they would not need to terminate their product/service delivery when their home country clients move out of China.

8.3.2 Recommendations to Chinese firms

Local Chinese firms should be aware of the fierce competition that foreign firms would give them in China when more market liberalization takes place. It is recommended that local Chinese firms exploit their strength in cost leadership while simultaneously strengthening their capabilities to respond to market changes. By providing new products continuously to meet new trends and identifying new opportunities, local Chinese firms may be able to create customer demand. It is also recommended that local Chinese firms take advantage of economies of scale by focusing on certain segments of the value chain and making technological innovations, thus cultivating their core competences in the Chinese market. At the same time, local firms may exploit diverse products/services based on these technological innovations through strategic alliances.

The study found that foreign firms are not adept at networking in China. It is recommended

that Chinese firms capitalize on their strengths in networking to achieve advantages, which include obtaining resources, knowledge and governance through the network. Chinese firms could also play the bridging role especially with foreign firms, to facilitate transfer of technology and management knowhow. The more important the role Chinese firms play in the network, the greater the power they wield, which is important for creating an advantageous environment for themselves.

8.4 Contribution to theory and knowledge

This study contributes to knowledge in several ways. It has developed and tested a model for foreign firms to enhance competitive performance in the Chinese construction market. This model extends the formulation of strategies based on Western economic concepts to include the ideas of Sun Tzu's military strategy and social networks, thus taking into consideration the Chinese culture in devising strategies. The formulation produces an integrated model comprising several critical strategies to achieve competitiveness.

Firstly, this study contributes to the knowledge of structure–conduct–performance (SCP) paradigm (Section 2.2.1) in China's construction market for foreign firms. The basic tenet of the S-C-P paradigm is that the economic performance of an industry is a function of the conduct of buyers and sellers which, in turn, is a function of the industry's structure (Mason, 1939; Bain, 1956). This research found that, besides industry level structural characteristics, the specific strategic management principles of local firms, cultivated in the local business,

also determine a firm's potential for competitive advantage. Thus, accompanying with the structural elements (S) in SCP paradigm, including "buyer and/ or seller concentration", "barriers to entry, product differentiation", and "the elasticity of demand for the product", the unique combination of business experience (Prahalad & Bettis, 1986) also gives rise to the sustainable competitive advantage.

The second contribution is that this study identifies the two configurations of strategies built on an analysis of performance indicators. In S-C-P paradigm, performance is defined by profit (Mason, 1939; Bain, 1956). This study shows that foreign firms measure performance from two dimensions: quantitative performance and qualitative performance. Furthermore, the study empirically demonstrates the co-effects of strategies based on Western economic concepts and the strategies influenced by Chinese dialectical management perspective towards achieving performance in different dimensions.

The third contribution is that this study shows each of Porter's (1980) generic strategies (Section 3.2) should not be used alone, despite Porter's warning that firms that do so would be 'stuck in the middle'. This work reveals that engaging in "cost leadership" and "differentiation" concurrently leads firms to achieve qualitative performance rather than "stuck in the middle" (Table 6.18 and Figure 6.2).

Fourthly, this study integrated the "resource network" segment of the social network theory (Granovetter, 1985) into firms' overall strategy to achieve qualitative performance (Section

6.4.1.3). The study found a negative relationship between “resource-network” and “qualitative performance” suggesting that too much dependence on social ties has a negative effect on foreign firms’ competitiveness. The application of the Network Theory of Embeddedness (Granovetter, 1985) should be carefully considered at this point of foreign firm’s development in China. In future, when foreign firms have a stronger foothold in China, this aspect should be revisited.

8.5 Contribution to practice

This study contributes to practice by providing foreign firms with a model to guide them in their decision making to select the critical strategies to enhance their competitive performance in the Chinese construction market. The usage of the PSN model enables foreign firms to know the combination of strategies to achieve competitive performance and to adopt the necessary practices to achieve these critical strategies.

The next contribution to practice is the PSN model may be used by foreign firms to assess their own competitiveness. By rating themselves objectively against each practice and calculating their aggregate scores, they may have an indication of whether they are operating competitively in the Chinese construction market. The areas where they obtain relatively low ratings indicate their weaknesses. They can then take corrective actions to improve their performance.

The PSN model shows the weight/index of each critical strategy. The contribution to practice is that foreign firms now know the relative importance of the critical strategies, and they can therefore make adjustments to their existing strategies. These weights may be useful because they are China-specific and hence more relevant to foreign firms in China. The weights are also useful to foreign firms who have intentions to enter the Chinese construction market in near future.

Finally, the study contributes to practice by showing that at this stage of development, foreign firms are not ready to manage networking in the Chinese construction market, especially those who do not have enough local Chinese partners. Foreign firms should know that the establishment of networks is a process rather than a single step. The gains from the networks will be accompanied by losses if foreign firms have not cultivated the capability to avoid or control such losses. This is especially serious for new participants.

8.6 Limitations of the research

One limitation of this research is the degree of reliability of the data gathered. The target population was foreign construction related consultancy firms operating in China's construction industry. Since there is no official document in China listing all the foreign construction related consultancy firms, and thus no official document listing the successful foreign firms in China, this research relied on the Yearbook of Shanghai Foreign-invested Enterprises and the Yearbook of Beijing Foreign-invested Enterprises as databases. However,

this may have excluded those foreign firms that are not registered, especially if they are only undertaking a project for a short period of time in China. Therefore, the data gathered may not be truly representative of foreign firms operating in the Chinese construction market. There is also no official measurement system to evaluate the performance of foreign firms in China. Although there are publications of benchmarks to evaluate the performance of foreign firms operating in China, none of them is nationally adopted and applied in China.

The second limitation of this study is that this research did not consider other factors (variables) besides those directly related to strategic management. These include government's actions, laws and regulations, global demand for China's products, project complexity, etc.

The third limitation is that this study only considered one side in the business transaction i.e. the suppliers (in this case, construction related consultancy firms). Thus, the input data for the model only come from the suppliers. It is acknowledged that suppliers' assessment of the input data may be different than that of the buyers. Thus, the model may be shaped by supplier bias and, if buyers were queried, a different set of variables might be shown as statistically significant.

The fourth limitation is in relation to the respondents. The reliability of the data gathered could be affected by the perceptual characteristics of the answers to each question. The rating of each practice is based on the respondents' perception of the level of importance of these questions on a Likert scale. Though this method for data collection has been used by many

researchers in diverse areas, the ratings derived from the Likert scale may not be totally reliable because different respondents may attach different values to different points of the scale. In addition, there may be a gap between assumed knowledge and real knowledge of the respondents. The research assumed that respondents have access to all information to answer the questions, but in reality, they may not have the intimate knowledge to answer some of the questions. This would weaken the reliability of the data gathered. To minimize this weakness, face-to-face interviews were conducted. The questions which may lead to misunderstanding were explained repeatedly until they were clear to respondents.

The fifth limitation is the relatively small sample size. This limitation may have restricted the generalizablility of the findings. Some statistically insignificant practices or relationships in this research may show significant importance if a larger sample size is provided. To address this weakness, PLS modeling technique was adopted, since it is able to process small sample size (see section 5.6.2.3).

The models' MAPE which are not small is the sixth limitation of the study. This may be because of the small number of experts who were invited to test the models, and other factors that affect competitiveness (see above). Therefore, future studies focusing on addressing the above limitations will be helpful to identify the ways to reduce MAPE.

8.7 Conclusion

The development of the Chinese construction market has made it an attractive destination for foreign firms. In order to survive and grow in China, which is different from the Western construction market, it is vital to know what strategies are appropriate and effective in this host country. This research addresses some of the questions found in competitive strategy studies such as: “Why do foreign firms need to consider strategies of both Western and Chinese origins?” and “How can foreign firms execute their original strategies (Western) by concurrently adopting strategies that are of Chinese origin?” It is important to know the feasibility and the approaches to combine strategies of both Western and Chinese origins because of the gradually realized gap between the foreign firms’ original business environment and the business environment in China.

In addressing the first question, it is essential for foreign firms to recognize that to realize their planned strategies, particular strategies cultivated in the local environment should be considered as the approaches for them to adjust themselves, adapt to the new environment and compete with their rivals. This study has identified that foreign firms adopt strategies on swiftness, adaptability, market intelligence by Sun Tzu and Granovetter’s (1985) network strategy in parallel with implementing Porter’s (1980) generic strategies.

The answer to the second question indicates that foreign firms need to realize there are different approaches to combine Porter’s generic strategies and local strategies, depending

on which aspects of competitive performance the firm is focusing on. Quantitative performance depends much on the collective functions of cost leadership, market-oriented swiftness and resource network strategy. Foreign firms emphasizing improvement in qualitative performance should be aware of the combined effects of differentiation, cost leadership, risk responsiveness and client-oriented swiftness. In addition, foreign firms may be able to achieve each critical strategy by choosing from the important practices identified in this study.

In conclusion, foreign construction-related firms should adopt a combination of critical strategies and appropriate management practices identified in this study to configure and develop the right kind of approach to enhance their competitive performance in the Chinese construction market.

8.8 Recommendations for future research

The two models developed in this study have limitations (see section 8.6). One recommendation for future research is to improve the models. One area to investigate further is the counter-intuitive results such as more adopting client-oriented swiftness (FAC6) leads to lower qualitative performance (see section 6.5.4.4). The future study could investigate if client-oriented strategy is context based and if it could bring both positive and negative consequences to firms in different situations.

Further studies could be carried out to improve the models constructed in this study by incorporating other variables, such as procurement methods, payment systems, and project management practices. Incorporating more variables into the models will make them more comprehensive and useful.

Future research could use the case study approach to investigate the effective strategies that foreign construction related consultancy firms use in China. Case studies of successful and less successful foreign firms could be carried out, so that the effective strategies and ineffective ones could be identified.

Another recommendation for future study is to compare the strategies used by foreign construction related consultancy firms in China and local Chinese firms. The comparative results would be useful in identifying the different strategies adopted and if same strategies are adopted, the different emphasis they place on the strategies. The findings could reveal generic but superior strategies adopted by both high performing foreign and Chinese firms.

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APPENDIX A SAMPLE LETTER AND SURVEY QUESTIONNAIRE

Department of Building
4 Architecture Drive, NUS
Singapore, 117566
Telephone: 659389 3030
Email address: g0600055@nus.edu.sg

Dear Sir/ Madam

MANAGEMENT PRACTICES ADOPTED BY FOREIGN FIRMS IN CHINA

I am conducting a study on the management practices adopted by foreign firms when operating in China's construction industry. This study involves a survey and your participation is very much needed and appreciated.

It will take you about 15 minutes to complete the questionnaire. As you are not required to state your name in the questionnaire, your anonymity is guaranteed.

A self-addressed and stamped envelope is enclosed for your use. If you would like a summary of the research findings, please tick the box below and send this page to me.

If you have any queries, please do not hesitate to contact me at Tel No: 65-93893030, or Email me at g0600055@nus.edu.sg.

Thank you

Yours faithfully

Li Shan (Ms)
Ph.D Candidate

Li Shan c/o Assoc Professor Florence Ling Fax: 65-67773953
Department of Building
School of Design and Environment
National University of Singapore, 4 Architecture Drive,
Singapore, 117566
Email: g0600055@nus.edu.sg

☐ Please let me have a summary of the research findings
Name:_____ Email address: _____

SURVEY ON MANAGEMENT PRACTICES ADOPTED BY FOREIGN FIRMS WHEN OPERATING IN CHINA'S CONSTRUCTION INDUSTRY

Instructions: please complete the questionnaire by filling in the blanks or ticking the relevant boxes.

PART 1: GENERAL PARTICULARS

1. Nature of your HQ's business (tick all that applies):

□ Building construction
□ Civil engineering construction
□ Architectural consultancy
□ M&E consultancy
□ Civil & structural engineering consultancy
□ Management (e.g. CM, PM, supervision)
□ Others (Please Specify):_____

2. Location of your firm's headquarters (country): _____.

3. Size of your firm's workforce (approximate):
   a.Worldwide: _____employees. b. China alone: _____employees

4. Your firm's estimated total annual revenue in China
   2005: RMB _____ 2006: RMB_____ 2007: RMB_____

5. Your firm's profit margin (approximate) in China:

a. Profit margin in 2005

1	2	3	4	5	6	7
Huge losses			Met the profit target			Exceed the profit target

b. Profit margin in 2006

1	2	3	4	5	6	7
Significantly lower than 2005			Same as 2005			Significantly higher than 2005

c. Profit margin in 2007

1	2	3	4	5	6	7
Significantly lower than 2006			Same as 2006			Significantly higher than 2006

6. Revenue from China, as a percentage of firm's total revenue: _____%

7. When did your firm enter China market? Since:_____(year)

8. Main locations of your firm's projects in China (cities): _____

9. Type of facilities your firm is involved in China: (e.g. industrial, commercial, residential, roads and highways)_____

10. Usual contract sum of facilities (approximate) in China: RMB_____

11. The most common service provided by your firm in project in China:

□ Main contractor
□ Subcontractor
□ Manager (PM, CM, supervision, etc)
□ Consultancy
□ Architect
□ City/town planner
□ Others (Please specify):_____

12. The most common way your firm is selected to provide the service in China:

□ Open competitive bidding. Number of firms involved: _____
□ Selective bidding/prequalification. Number of firms involved: _____
□ Negotiation. Number of firms involved: _____
□ Others: (please specify): _____

PART 2 Market Position

No	Please circle a number on the scale that best reflects your firm's position in China as compared to its major competitor.	1=my major competitor is far more competitive than my firm 4=my firm has same competitiveness as its major competitor 7=my firm is far more competitive than its major competitor						
1	Firm is competitive in winning large number of projects	1	2	3	4	5	6	7
2	Firm is competitive in winning high-value projects	1	2	3	4	5	6	7
3	Firm is profitable	1	2	3	4	5	6	7
4	Firm's product/service quality is competitive	1	2	3	4	5	6	7
5	Firm is competitive in achieving client satisfaction	1	2	3	4	5	6	7
6	Firm is competitive in achieving good public image	1	2	3	4	5	6	7
7	Firm is competitive in fast product/service delivery	1	2	3	4	5	6	7

PART 3 Management Practices Adopted

No	Please circle the number on the scale that best reflects the extent to which your firm adopts the practices in China	1=my firm does not practice this 4=my firm practices this to a moderate extent 7=my firm practices this to a great extent						
1	**Cost leadership**							
1.1	Firm learns continuously	1	2	3	4	5	6	7
1.2	Firm establishes vertical linkages	1	2	3	4	5	6	7
1.3	Firm invests in technology	1	2	3	4	5	6	7
1.4	Firm cuts supplier's prices	1	2	3	4	5	6	7
1.5	Firm reconfigures its value chain	1	2	3	4	5	6	7
1.6	Firm reduces costs in its operations	1	2	3	4	5	6	7
1.7	Firm reduces costs in administrative activities	1	2	3	4	5	6	7
1.8	Firm avoids making changes to the process	1	2	3	4	5	6	7
1.9	Firm's Staff undergo training regularly	1	2	3	4	5	6	7
1.10	Firm offers low price for its products/services	1	2	3	4	5	6	7
2	**Differentiation**							
2.1	Firm offers product/service which has unique features	1	2	3	4	5	6	7
2.2	Firm includes superior design techniques or adopts superior construction technology or management in product/service delivery.	1	2	3	4	5	6	7
2.3	Firm ensures the quality of inputs are high	1	2	3	4	5	6	7
2.4	Firm provides high quality outputs (products and services)	1	2	3	4	5	6	7
2.5	Firm provides innovative product/service	1	2	3	4	5	6	7
2.6	Firm offers comprehensive services to clients	1	2	3	4	5	6	7
3	**Focusing**							
3.1	Firm serves one or two specific geographic construction market in China (eg, Beijing, Shanghai)	1	2	3	4	5	6	7
3.2	Firm operates in a specific construction facility segment (eg, residential, hospital, infrastructure)	1	2	3	4	5	6	7
3.3	Firm serves only a specific group of clients	1	2	3	4	5	6	7
3.4	Firm offers a focused range of products/ services	1	2	3	4	5	6	7
4	**Swiftness**							
4.1	Firm's achieves fast delivery from suppliers	1	2	3	4	5	6	7
4.2	Firm owns fast internal communication	1	2	3	4	5	6	7

No	Please circle the number on the scale that best reflects the extent to which your firm adopts the practices in China	1=my firm does not practice this 4=my firm practices this to a moderate extent 7=my firm practices this to a great extent						
4.3	Firm accommodates the client's incessant requests	1	2	3	4	5	6	7
4.4	Firm takes plans to improve the speed of execution	1	2	3	4	5	6	7
4.5	Firm innovates its product/service continuously	1	2	3	4	5	6	7
4.6	Firm collaborates actively	1	2	3	4	5	6	7
5	**Adaptability**							
5.1	Firm creates an adaptable organizational structure	1	2	3	4	5	6	7
5.2	Firm does innovative marketing for products in advance	1	2	3	4	5	6	7
5.3	Firm establishes organizational culture based on adaptability mechanism	1	2	3	4	5	6	7
5.4	Firm offers options when faced with changes during the implementation	1	2	3	4	5	6	7
5.5	Firm encourages employee participation in decision making	1	2	3	4	5	6	7
5.7	Firm has a post-change responsive system to pay compensation for losses arising from unexpected events.	1	2	3	4	5	6	7
6	**Market Intelligence**							
6.1	Firm obtains information from local agents	1	2	3	4	5	6	7
6.2	Firm appoints dedicated staff/team to deal with government approvals	1	2	3	4	5	6	7
6.3	Firm assesses risks comprehensively before embarking on a project in China	1	2	3	4	5	6	7
6.4	Firm equips itself with good information and communication infrastructure	1	2	3	4	5	6	7
6.5	Firm equips itself with good information analysis infrastructure	1	2	3	4	5	6	7
6.6	Firm accesses broad market information	1	2	3	4	5	6	7
7	**Network**							
7.1	Firm establishes mutual trust among other firms in its network	1	2	3	4	5	6	7
7.2	Firm has long-term commitment with other firms in the network	1	2	3	4	5	6	7
7.3	Firm resolves conflicts efficiently	1	2	3	4	5	6	7
7.4	Firm seeks mutually supportive actions with other firms in its network	1	2	3	4	5	6	7
7.5	Firm engages in multi-level partnering	1	2	3	4	5	6	7
7.6	Firm achieves political backing from the Chinese government	1	2	3	4	5	6	7
7.7	Firm achieves political backing from home country's government	1	2	3	4	5	6	7
7.8	Firm is a member of a consortium in China	1	2	3	4	5	6	7
7.9	Firm partners with local PRC firms	1	2	3	4	5	6	7
7.10	Firm collaborates with its competitors to add value to its product/service	1	2	3	4	5	6	7
7.11	Firm encourages information communication across hierarchies	1	2	3	4	5	6	7
7.12	Firm obtains resources from other firms in its network	1	2	3	4	5	6	7
7.13	Firm establishes routes to share knowledge with other firms in its network	1	2	3	4	5	6	7

No	Please circle the number on the scale that best reflects the extent to which your firm adopts the practices in China	1=my firm does not practice this 4=my firm practices this to a moderate extent 7=my firm practices this to a great extent						
7.14	Firm sets up network proactively	1	2	3	4	5	6	7
7.15	Firm sets up network contingently	1	2	3	4	5	6	7
7.16	Firm sets up compatible goals with partners	1	2	3	4	5	6	7
7.17	Firm enlarges the number of partners							
1.								
2.								
3.								

INFORMATION OF RESPONDENT

1. Designation/job title of person providing the information: _____
2. Are you personally involved in projects in China? □ No □ Yes
3. Number of years you have practiced in the construction industry: _____years.
4. Number of years you have practiced in China: _____years.
5. Your name: (optional) _____
6. Name of your firm: (optional) _____

All information will be kept strictly confidential

End of the survey. Thank you very much

Li Shan, Department of Building, School of Design and Environment

National University of Singapore, 4 Architecture Drive,

Singapore, 117566. Email: g0600055@nus.edu.sg

Tel: 6597336555

APPENDIX B-1 MODEL VALIDATION INSTRUMENT-1

Department of Building
4 Architecture Drive, NUS
Singapore, 117566
Telephone: 659733 6555
Email address: g0600055@nus.edu.sg

Dear Sir/ Madam

MANAGEMENT PRACTICES ADOPTED BY FOREIGN FIRMS IN CHINA

I am conducting a study on the management practices adopted by foreign firms when operating in China's construction industry. This study involves a survey and your participation is very much needed and appreciated.

It will take you about 15 minutes to complete the questionnaire. As you are not required to state your name in the questionnaire, your anonymity is guaranteed.

A self-addressed and stamped envelope is enclosed for your use. If you would like a summary of the research findings, please tick the box below and send this page to me.

If you have any queries, please do not hesitate to contact me at Tel No: 65-97336555, or Email me at

g0600055@nus.edu.sg.

Thank you

Yours faithfully

Li Shan (Ms)
Ph.D Candidate

Li Shan c/o Assoc Professor Florence Ling Fax: 65-67773953
Department of Building
School of Design and Environment
National University of Singapore, 4 Architecture Drive,
Singapore, 117566
Email: g0600055@nus.edu.sg

☐ Please let me have a summary of the research findings
Name:_____ Email address: _____

SURVEY ON MANAGEMENT PRACTICES ADOPTED BY FOREIGN FIRMS WHEN OPERATING IN CHINA'S CONSTRUCTION INDUSTRY

Instructions: please complete the questionnaire by filling in the blanks or ticking the relevant boxes.

PART 1: GENERAL PARTICULARS

1. Nature of your HQ's business (tick all that applies):

□ Building construction
□ Civil engineering construction
□ Architectural consultancy
□ M&E consultancy
□ Civil & structural engineering consultancy
□ Management (e.g. CM, PM, supervision)
□ Others (Please Specify):_____

2. Location of your firm's headquarters (country): _____.

3. Size of your firm's workforce (approximate):
   a.Worldwide: _____employees. b. China alone: _____employees

4. Your firm's estimated total annual revenue in China
   2005: RMB _____ 2006: RMB_____ 2007: RMB_____

5. Your firm's profit margin (approximate) in China:

a. Profit margin in 2005

1	2	3	4	5	6	7
Huge losses			Met the profit target			Exceed the profit target

b. Profit margin in 2006

1	2	3	4	5	6	7
Significantly lower than 2005			Same as 2005			Significantly higher than 2005

c. Profit margin in 2007

1	2	3	4	5	6	7
Significantly lower than 2006			Same as 2006			Significantly higher than 2006

6. Revenue from China, as a percentage of firm's total revenue: _____%

7. When did your firm enter China market? Since:_____(year)

8. Main locations of your firm's projects in China (cities): _____

9. Type of facilities your firm is involved in China: (e.g. industrial, commercial, residential, roads and highways)_____

10. Usual contract sum of facilities (approximate) in China: RMB_____

11. The most common service provided by your firm in project in China:

□ Main contractor
□ Subcontractor
□ Manager (PM, CM, supervision, etc)
□ Consultancy
□ Architect
□ City/town planner
□ Others (Please specify):_____

12. The most common way your firm is selected to provide the service in China:
□ Open competitive bidding. Number of firms involved: _____
□ Selective bidding/prequalification. Number of firms involved: _____
□ Negotiation. Number of firms involved: _____
□ Others: (please specify): _____

PART 2 Market Position

No	Please circle a number on the scale that best reflects your firm's position in China as compared to its major competitor.	1=my major competitor is far more competitive than my firm 4=my firm has same competitiveness as its major competitor 7=my firm is far more competitive than its major competitor						
1	Firm is competitive in winning large number of projects	1	2	3	4	5	6	7
2	Firm is competitive in winning high-value projects	1	2	3	4	5	6	7
3	Firm is profitable	1	2	3	4	5	6	7
4	Firm's product/service quality is competitive	1	2	3	4	5	6	7
5	Firm is competitive in achieving client satisfaction	1	2	3	4	5	6	7
6	Firm is competitive in achieving good public image	1	2	3	4	5	6	7

PART 3 Management Practices Adopted

No	Please circle the number on the scale that best reflects the extent to which your firm adopts the practices in China	1=my firm does not practice this 4=my firm practices this to a moderate extent 7=my firm practices this to a great extent						
1	**Cost leadership**							
1.1	Firm learns continuously	1	2	3	4	5	6	7
1.2	Firm establishes vertical linkages	1	2	3	4	5	6	7
1.5	Firm reconfigures its value chain	1	2	3	4	5	6	7
1.6	Firm reduces costs in its operations	1	2	3	4	5	6	7
1.9	Staff undergo training regularly	1	2	3	4	5	6	7
2	**Differentiation**							
2.1	Firm offers products/services which have unique features	1	2	3	4	5	6	7
2.2	Firm includes superior design techniques or adopts superior technology or management in product/service delivery.	1	2	3	4	5	6	7
2.3	Firm ensures the quality of inputs are high	1	2	3	4	5	6	7
2.4	Firm provides high quality outputs (products and services)	1	2	3	4	5	6	7
2.5	Firm provides innovative product/service	1	2	3	4	5	6	7
2.6	Firm offers comprehensive services to clients	1	2	3	4	5	6	7
3	**Focusing**							
3.2	Firm operates in a specific construction facility segment	1	2	3	4	5	6	7
3.4	Firm offers a focused range of products/ services	1	2	3	4	5	6	7
4	**Swiftness**							
4.1	Firm achieves fast delivery from suppliers	1	2	3	4	5	6	7
4.2	Firm owns fast internal communication	1	2	3	4	5	6	7
4.3	Firm accommodates the client's incessant requests	1	2	3	4	5	6	7
4.4	Firm takes plans to improve the speed of execution	1	2	3	4	5	6	7
4.5	Firm keeps on innovating its products	1	2	3	4	5	6	7
4.6	Firm collaborates actively	1	2	3	4	5	6	7
5	**Adaptability**							

No	Please circle the number on the scale that best reflects the extent to which your firm adopts the practices in China	1=my firm does not practice this 4=my firm practices this to a moderate extent 7=my firm practices this to a great extent						
5.1	Firm creates an adaptable organizational structure	1	2	3	4	5	6	7
5.2	Firm does innovative marketing for products in advance	1	2	3	4	5	6	7
5.3	Firm establishes organizational culture based on adaptability mechanism	1	2	3	4	5	6	7
5.4	Firm offers options when faced with changes during the implementation	1	2	3	4	5	6	7
5.5	Firm encourages employee participation in decision making	1	2	3	4	5	6	7
5.7	Firm has a post-change responsive system to pay compensation for losses arising from unexpected events	1	2	3	4	5	6	7
6	**Market Intelligence**							
6.3	Firm assesses risks comprehensively before embarking on a project in China	1	2	3	4	5	6	7
6.4	Firm equips itself with good information and communication infrastructure	1	2	3	4	5	6	7
6.6	Firm accesses broad market information	1	2	3	4	5	6	7
7	**Network**							
7.1	Firm establishes mutual trust among other firms in its network	1	2	3	4	5	6	7
7.2	Firm has long-term commitment with other firms in the network	1	2	3	4	5	6	7
7.3	Firm resolves conflicts efficiently	1	2	3	4	5	6	7
7.4	Firm seeks mutually supportive actions with other firms in its network	1	2	3	4	5	6	7
7.9	Firm partners with local PRC firms	1	2	3	4	5	6	7
7.11	Firm encourages information communication across hierarchies	1	2	3	4	5	6	7
7.13	Firm establishes routes to share knowledge with other firms in its network	1	2	3	4	5	6	7
7.14	Firm sets up network proactively	1	2	3	4	5	6	7
7.16	Firm sets up compatible goals with partners	1	2	3	4	5	6	7

INFORMATION OF RESPONDENT

1. Designation/job title of person providing the information: _____
2. Are you personally involved in projects in China? □ No □ Yes
3. Number of years you have practiced in the construction industry: _____years.
4. Number of years you have practiced in China: _____years.
5. Your name: (optional) _____
6. Name of your firm: (optional) _____

All information will be kept strictly confidential

End of the survey. Thank you very much

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Tel: 6597336555

APPENDIX B-2 MODEL VALIDATION INSTRUMENT-2

Dear Sir/ Madam

Based on the questionnaire survey conducted from June 2009 to November 2009, we identified eight strategies: (X1) Differentiation; (X2) Focus-training; (X3) Cost leadership;

(X4) Risk responsiveness; (X5) Market-oriented swiftness; (X6) Client-oriented swiftness; (X7) Trust; and (X8) Resource, were used to determine foreign firms' competitive performance in quantitative dimension (Y1) and qualitative dimension (Y2). We call this model as PSN competitive strategy model, which is for foreign firms to enhance competitive performance in China's construction market (shown in next page).

Your feedback on these models is valuable and necessary for our research.

If you have any queries, please do not hesitate to contact me at Tel No: 65-97336555, or Email me at g0600055@nus.edu.sg.

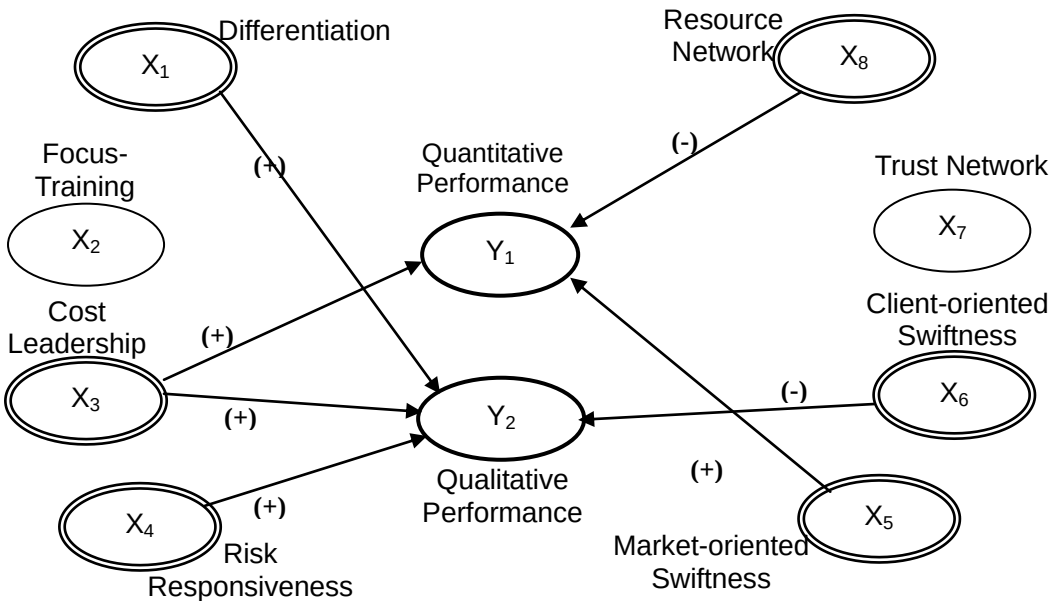
Thank you

Yours faithfully

Li Shan (Ms)

Ph.D Candidate

PSN Competitive strategy model



(+) means the effect is positive, while (-) means the effect is negative

Model	Description of Model	Positive strategies	Negative strategies
Y1	--Win large number of project; --Win large value projects --Being profitability	X3: Cost leadership X5: Market-Oriented Swiftness	X8: Resource Network
Y2	--Achieve high quality products --Achieve high client satisfaction --Achieve good public image	X1: Differentiation X3: Cost Leadership X4: Risk Responsiveness	X6: Client-Oriented Swiftness

Please give some comments on this PSN

(1) Do you think the two dimensions (Y1 and Y2) within this PSN model are not sufficient to cover the aspects of the competitive performance of foreign firms in China's construction market? If they are insufficient, what else will you suggest?

(2) Do you think the foreign firms need to focus on one dimension (Y1 or Y2) or keep a balance between Y1 and Y2?

(3) What do you think about the practicability of this PSN model for the foreign construction firms operating in China?

(4) You may realize that two other strategies (X2: Focus-training; X7: Trust Network) bringing no effects to either Y1 or Y2.

Do you think they also contribute to the competitive performance for the firms?

(5) Do you think that it would be helpful to develop a computer program for foreign firms to choose viable strategies and improve their performance in China?

What kind of style do you like? (Functions of the program)

INFORMATION OF RESPONDENT

Designation/job title of person providing the information: _____

Are you personally involved in projects in China? □ No □ Yes
Number of years you have practiced in the construction industry: _____years.
Number of years you have practiced in China: _____years.
Your name: (optional) _____
Name of your firm: (optional) _____

All information will be kept strictly confidential

End of the survey. Thank you very much

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